5-2014

Disaster and poverty : the differential impacts of disaster on the poor in the Gulf Coast region.

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DISASTER AND POVERTY: THE DIFFERENTIAL IMPACTS OF DISASTER ON THE POOR IN THE GULF COAST REGION

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A Dissertation
Submitted to the Faculty of the
College of Arts and Sciences of the University of Louisville
In Partial Fulfillment of the Requirements
For the Degree of

Doctor of Philosophy

Department of Urban and Public Affairs
University of Louisville
Louisville, Kentucky

May 2014

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DEDICATION

This dissertation is dedicated to my Parents

Mr. Amir Jahan

And

Mrs. Momena Akhter

who have given me invaluable educational opportunities.

ACKNOWLEDGMENTS

I would like to thank my major professor, Dr. David M. Simpson, for his guidance and patience. I would also like to thank the other members of committee, Dr. Cynthia Negrey, Dr. Hank V. Savitch, Dr. John Hans I. Gilderbloom, and Dr. Melissa K. Merry, for their comments and assistance over the past four years. I thank the University of Louisville, Department of Urban and Public Affairs for providing me a research assistantship during the period required to complete my dissertation. There were many other fellow graduate students whose advice and comments were not only supportive but also helped to enhancements and improvement in the text. I would like to thank my family for all their love and encouragement. I would like to thank my parents who raised me with a love of education and supported me in all my pursuits.

ABSTRACT

DISASTER AND POVERTY: THE DIFFERENTIAL IMPACTS OF DISASTER ON POOR IN THE GULF COAST REGION

Abu Muhammad Sufiyan

June 10, 2013

Low-income and vulnerable populations that suffer most in natural disasters are females, children, elderly, disabled, and ethnic minorities This dissertation explores the association between natural disaster and poverty conditions among socially disadvantaged subgroups within the social, economic, and political contexts of the disaster affected regions in the Gulf Coast States. It argues that poverty conditions increase the negative impacts of disaster for socially vulnerable populations. This dissertation advocates incorporating the vulnerabilities of the marginalized population in each phase of disaster management planning, from mitigation to recovery.

The study uses correlation and regression analyses to find the association between disaster impacts and different poverty conditions. The study of 534 counties of Alabama, Florida, Louisiana, Mississippi, and Texas reveals that people living in poverty have a significant positive association with disaster fatalities and property damage, which demonstrates that natural disasters are likely to increase poverty. Moreover, the counties with more socially disadvantaged groups are more vulnerable to disaster. In conclusion, the author proposes that integration of vulnerabilities of socially disadvantaged groups into disaster mitigation policies can fundamentally reduce the loss of human life and economic loss of a society from natural disaster.

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CHAPTER 1

INTRODUCTION

Throughout time, disasters have been explained as acts of God, luck, fortune, or fate, and have often been overlooked as being intertwined with social stratification (Bryant 2005; Steinberg, 2000; Weichselgartner, 2001). However, disaster destructions are not merely a natural phenomenon, but are the outcome of the social, political, and economic environments. (Zebrowski & Howard, 2005). Poor people around the world suffer more from disaster losses due to limited access to public and private recovery assets, both in developing and industrialized countries (Fothergill & Peek, 2004). The main objective of this research is to investigate how disasters exacerbate poverty conditions and to explore how poverty makes people more vulnerable to disaster. The study will develop quantitative models based on secondary data analysis in order to explore the impacts of disaster on different poverty conditions in Gulf Coast States of the United States.

1.1 Statement of the Problem

The number and severity of disasters have increased in recent decades. Developed countries are not immune from this trend (Newkirk, 2001). Approximately 8,651,000 U.S. citizens, or slightly more than 3.0% of the total U.S. population, live in 1% annual chance coastal flood hazard areas, in Atlantic, Gulf, Pacific, and Great Lakes coasts, as defined by FEMA (Crowell et al., 2010). An increasing trend toward a greater demographic and socio-economic shift, combined with mounting disaster losses, have brought a

concerned focus among scholars on how changing demographic patterns shape the vulnerability and resiliency of social systems (Donner & Rodríguez, 2008).

Natural hazards have great impacts on the economy, the environment, and public health. The United States spent about 0.25 billion USD per week on meteorological disasters, and about 6,000 people were killed and 50,000 people were injured during the period from 1975 to 1994 (Inyang, 2000). The long-term rise in the expense of disasters is due primarily to socio-economic alterations such as population growth and development in vulnerable areas (Schiermeier, 2012). In the first few years of the twenty-first century, the United States has faced a string of catastrophes, including seven hurricanes that hit the United States within a 15-month period (Michel-Kerjan, 2008). In recent decades, massive population growth and economic development in hazard-prone areas have significantly increased the possibility of multiple hazards such as wreckage and destruction of buildings, bridges, power plants, and other infrastructure; thus, an aggravated danger of economic and social function disruption is posed to the community (Y. Li, Ahuja, & Padgett, 2012). Economic losses occur from disaster because of the damage to infrastructure and reduction in revenues from the affected region, due to low yield (Kaur, 2006).Tropical storms, such as cyclones, hurricanes and typhoons pose major threats to coastal populations. Consequently, approximately two million individuals worldwide have died and millions have been injured over the past two centuries as a result of tropical storms (Haque et al., 2012).

The meta-analysis of twenty-two disaster loss studies clearly demonstrates that economic losses from various weather-related natural hazards, such as storms, tropical cyclones, floods, and small-scale weather events (e.g., wildfires and hailstorms) have increased in the United States and around the globe (Bouwer, 2011; K. J. Tierney, Lindell, & Perry, 2001). As populations are increasingly living in vulnerable areas, the problem is getting worse, as was noted during Hurricane Katrina (Nates & Moyer, 2005). The impacts from natural disasters are increasing due to developments related to overpopulation and migration to cities and to coastal areas (James, Subbarao, & Lanier, 2008). Experts predict that future disasters would be more intense due to the increasing complexity of human society and the ever growing size and density of the built environment (Brody, Highfield, & Kang, 2011; Joshua D, 1999).

Currently, climate scientists predict there is a small but real possibility that climate change will lead to catastrophic events that threaten civilization (Kaufman, 2012). Sea level rise has resulted in elevated storm

surges, loss of coastal wetland, and salt water intrusion, all affecting coastal communities (Shuang-Ye, Najjar, & Siewert, 2009). The global burden of weather-related disasters might increase in the coming decades, threatening the development processes and thwarting the advancement toward poverty reduction (Few, Osbahr, Bouwer, Viner, & Sperling, 2006). Nature being what it is, there will be floods, earthquakes, forest fires, sudden and virulent new catastrophes (Narveson, 2004). A natural disaster can create a turmoil of human melancholy from the loss of possessions, records and traces of identity, employment and human life. In the aftermath, creating a habitable environment is daunting when the necessities of life are damaged or destroyed (Epley, 2010; Wells, 2008). In conjunction with the mounting threats of climate change, there is an increasing awareness of the relationship between poverty and disasters around the world. Therefore, the more affluent states have a responsibility to assist in the fight against poverty (P. Becker, 2011).

1.2 Purpose of the Study

The United States has experienced major transformations in population size, development patterns, economic conditions, and social characteristics during the past few decades. These social, economic, and built-environment variations altered the American hazardscape in an intense way, as more people are living in high-risk hazard-prone areas than ever before (Burton, Kates, & White, 2005; Cutter & Finch, 2008). Similar to other parts of the world, an increasing number of people are living in risk-prone areas in the United States (Mileti, 1999), and the risk is aggravated by poverty, population growth, political turbulence, institutional fiascos of governance, and irrational environmental practices (de Vries, 2011). The awareness regarding the devastating effects of disaster on human populations has risen as a result of large-scale catastrophes such as Hurricanes Katrina and Rita (Wasileski, Rodríguez, & Diaz, 2011), and more recently Hurricanes Irene and Sandy.

The tragedy of the disasters is entangled in a deeper knot of causal factors that are social, economic and political in nature, including rapid population growth, urbanization, changing building styles, environmental degradation, and lack of preparedness and mitigation (Halvorson & Hamilton, 2010). Linking long-term disaster risk management with poverty reduction can be viewed as an intrinsically flexible mechanism of planned disaster resilience. Greater resilience of income stability, employment diversification,

access to resources, information and material possessions, improves poor's abilities to autonomously adapt to altering risks (Few et al., 2006). Hurricane Katrina, a category five hurricane, stormed the Gulf Coast of the United States, devastating the area. The country was unprepared to deal with the consequences of flooding and the evacuation, despite prior warnings (L. F. Diaz, 2006; Nates & Moyer, 2005). More recently, Hurricane Sandy resulted in lost and disrupted lives, and communities washed out. The New York City subway system was paralyzed by flooded tunnels, and downed power lines left the lower part of Manhattan and 90 percent of Long Island residents in without power for several days (Barron, 2012).

The economic and insured losses from natural disasters have increased significantly over time due to the risk exposure resulting from economic development and urbanization (Hollander, 2003; Kunreuther, 2008; Scawthorn, 2011; World Bank, 2012). For the first time in human civilization, we are approaching a time when more people will live in cities than in rural areas, and many of those conurbations are located in areas prone to earthquakes, hurricanes, and other natural disasters (Comerio, 2000). Currently, more than one-half of the world's population lives in cities (Lucchi, 2012). Researchers estimate the urban population will increase by 1.6 billion, to reach 4.9 billion by 2030. This transition will result in a disorganized urban landscape, as many poor people relocate to cities in search of employment , resulting in illegal and unplanned dense settlements absent of basic public infrastructure (Patel & Burke, 2009). The rapid expansion of urban centers has created large areas of poverty, where in which people are extremely vulnerable to calamities (Pinera & Reed, 2007). Since the vast number of future generations will be at significant risk of catastrophes, sustainable disaster planning incorporating the special needs of socially disadvantaged population for minimizing expected devastation is required (Rendall, 2011).

1.3 Overall Rationale of the Study

Disaster literature has historically focused on emergency response and recovery; however, it is incomplete without simultaneous study of societal hazards and risks, including data on the vulnerability of people living in hazard-prone areas (National Research Council, 2006). Although it is widely recognized that the poor and other marginalized communities are more vulnerable to disaster risk, there have been relatively few empirical research studies conducted on risk perception, disaster preparedness, and response for people

with low socio-economic status (Fothergill & Peek, 2004). According to the National Research Council (2006), future disaster research should focus on empirical explorations of social vulnerability and resilience to natural hazards and disasters. Such research would contribute to current theories and findings on disaster response and recovery in light of demographic, economic, and social trends. Currently, disaster responses seem biased towards affluent people, though the poor and disadvantaged suffer during and after disasters. Many government agencies pledge adequate support; however, this support frequently not provided in a timely manner. Even after Hurricane Katrina, the Federal response was slow; government agencies seemed incapable of dealing with the disaster. The response time and process became politicized (Glaeser, 2011; Raphael & Ma, 2011). In the six years following Hurricane Katrina, the number of Americans living in poverty increased by almost six million, which implies that if any major American city did have another severe storm, there would be unprecedented devastation, particularly for those residents living in poverty (Goff, 2011).

Most disaster literature has focused on a single disaster within a limited geographic boundary; therefore, our broader understanding, of both our physical environments, and the ways in which environment and society interact, remains incomplete (K. J. Tierney et al., 2001). This study responds to this incomplete knowledge by conducting a systematic comparative study that aggregated the social, economic, and political influences on affected populations. A comparative study using quantitative measures will help to understand how different actions (e.g., training and education, early warning, contingency management, business continuity plan, risk mitigation etc.) during the phases of preparedness, mitigation, response, and recovery would be effective for certain population groups. The goal is to have a better understanding about the social, economic, and political factors that influence the response of different socially disadvantaged groups. Understanding the intertwined nature of poverty conditions and disaster management is complex, and certainly not an objective that can be achieved through a single study (Levitt & Whitaker, 2009). Nevertheless, the broad rationales of this study are as follows:

a) A very small number of empirical studies have been conducted on the impacts of disaster on the people with low socio-economic status. This study will help to fill that literature gap.

b) The findings of this study in light of demographic, economic, and social trends will contribute to current disaster theories.

c) It is important for social scientists and emergency managers to know about the behavior of citizens with low socio-economic status in order to formulate a comprehensive emergency management plan. This study will help to understand these dynamics.

d) The understanding of this study will help emergency managers of different humanitarian organizations to develop a better strategy for poverty reduction, incorporating dimensions of disasters that recognize poverty goes hand in hand with disaster risk.

e) This study will also help to understand how poverty conditions instigate social tensions and weaken social cohesion in response to the potential disasters.

1.4 Research Questions and Hypothesis

This study will address the following research questions:

1) Do natural disasters exacerbate poverty?
2) Does poverty result in higher losses in a disaster?

The research will conduct a secondary data analysis and content analysis to develop a model linking poverty, vulnerability, and impacts of disasters. The basic hypotheses the research will test are as follows:

H1: Natural disasters are likely to increase poverty conditions.

H2: If there is a natural disaster, it is more likely to increase government expenditure.

H3: If the poverty level is higher in a county, the impacts from disaster will be higher.

H4: The higher the poverty conditions in counties, the higher social vulnerability from disasters.

1.5 Chapter Summaries

This dissertation has five chapters. *Chapter 1* introduces the research approach, purpose and rationale of the study, research questions, and the summary. *Chapter 2* reviews the existing studies and literature regarding disaster, poverty conditions, and differential impacts of disasters on socially disadvantaged population within the social, economic, and political context of disaster affected areas. Chapter 2 provides a theoretical basis for further analysis considering the existing literature gaps related to the intersection of natural disasters with different poverty conditions for Gulf Coast states. It also serves as a theoretical ground for the research design. *Chapter 3* states the research design, methodologies, data collection, and analyses procedures. *Chapter 4* displays the results of analysis of the impacts of disaster on poverty conditions and economic status, the association between poverty conditions on disaster losses, and the influence of poverty conditions on social vulnerability. Chapter 4 also displays the frequency of different types of natural disaster and their impacts on Alabama, Florida, Louisiana, Mississippi, and Texas. *Chapter 5* provides concluding remarks, implications of the results on policy and practice, and suggestions for further research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Due to the climate change, depletion of natural resources, poor land use choices, and environmental degradation, natural disasters are becoming more frequent in recent decades and predicted to increase the severity and frequency in future decades (Bergholt & Lujala, 2012). While the balance of economics, equity, and environment is the key factor for reduction of disaster risk, everywhere the gap between the rich and the poor is widening from the global to local scale. It is widely agreed that world income inequality between people is now all time high as top 0.25 percent of the world's population now own as much wealth as the other 99.75 percent (Beaverstock, Hubbard, & Rennie Short, 2004). Currently, 80 percent of the world's natural resources are used by 20% richest people (Matthew & Hammill, 2009). There is a tremendous wealth gap between lower density suburbia and high density inner cities. Gleeson (2008) suggests that the responsibilities of environmental hazards lie on the wealthy inhabitants of cities, not middle-income or poor segment of population. The resiliency of a city is dependent on equity, not simple equality, and the fair distribution of wealth as well as environmental amenities (Gleeson, 2008).

As poverty is a multidimensional manifestation and the poor are highly heterogeneous group, efforts to reduced poverty in its multifarious dimensions must recognize this multiplicity and how it is reflected in constraints and opportunities for rising out of poverty (B. Parker & Kozel, 2007). It is true that the epistemological base underlying social passion is more "heart" than "head" (Beck, 1981), and the sufferings of poor during the hurricane Katrina in New Orleans were also sparked the debate regarding disaster and poverty. It raised specific concerns among social scientists. During the emergency response the inequity in relief was explicitly articulated in different studies, media, and conference discourses. Along

with poverty, race has also played a major factor in that emergency response in the United States. The opportunist corporate entities were contracted for rebuilding New Orleans after Hurricane Katrina. The poor people were unable to return to their home while the well-off residents returned soon after the disaster (Adams, T, & English, 2009). Stivers (2007) described how the urban administrative process systematically excluded the poor and the black people from the recovery process aftermath of Katrina. The urban poor are not only lacking power but also spatially segregated in the high risk areas. As a result they are in miasma during disasters and post-disaster rehabilitation programs.

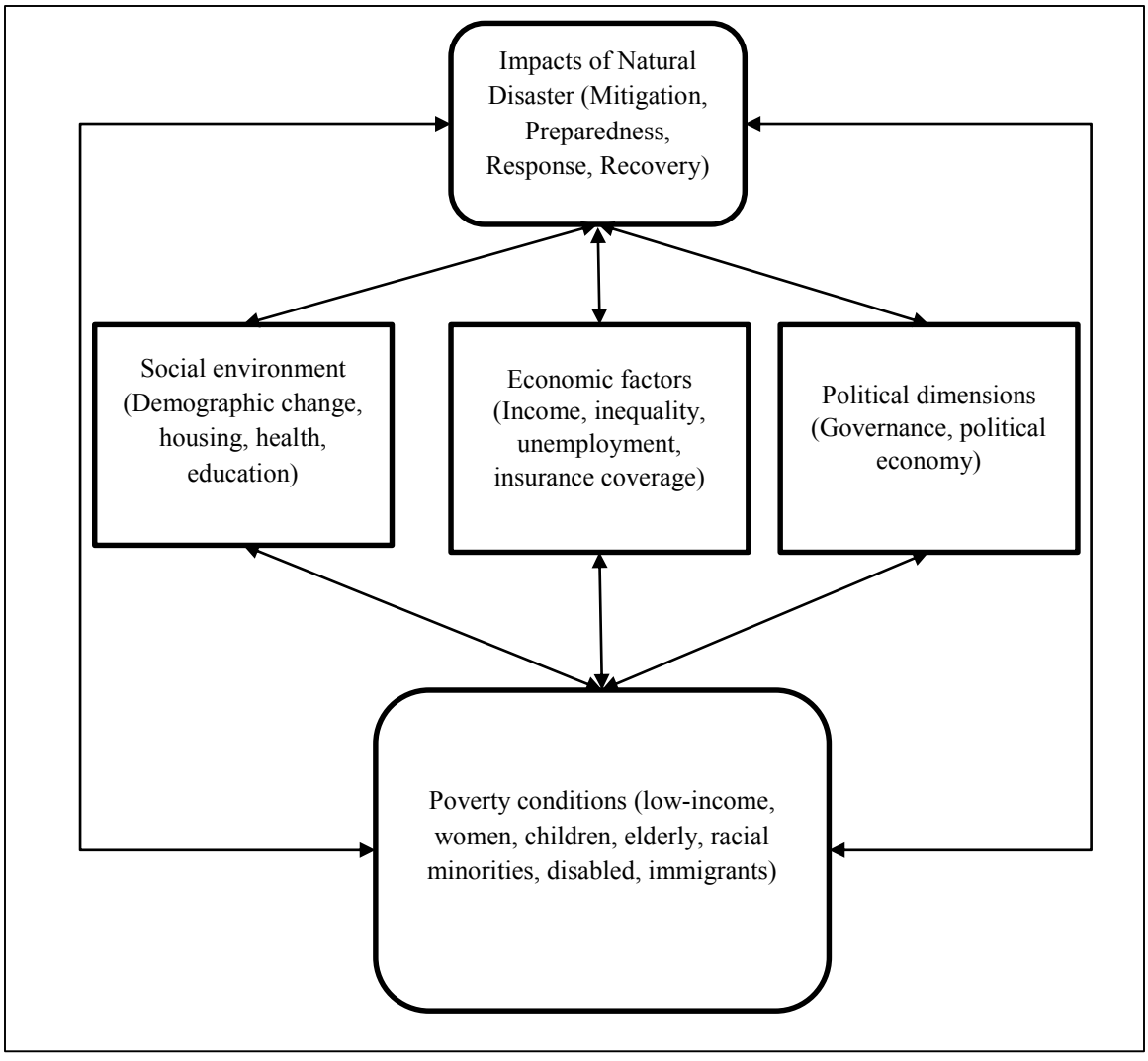

Figure 1: Simplified Framework for Literature Review

Disasters impact the socially disadvantaged groups within the existing social, economic, and political contexts. Only the technological measure, how sophisticated it would be, cannot eliminate the risk of enormous natural disaster. For instance, building codes can protect buildings only up to a certain magnitude of earthquake. The resilience and security of cities is dependent on the broader socio-economic context, because cities are more than just built forms. A city is a complex phenomenon of social structures, economic power, political decisions, legal heritage as well as cultural experience (Svensen, 2009; Torrence & Grattan, 2002; Vale & Campanella, 2005). A well enabled community can adapt to any unpredictable disaster situation as it has the ability to anticipate and plan for disaster and recover from disaster through effective community leadership (Ursano, McCaughey, & Fullerton, 2001). Consequently, disaster resilient communities can limit physical damage and disruptions of productivity, and restore or even improve their quality of life after a disaster strikes (D. S. Miller & Rivera, 2011). Several studies showed that many victims perceive the disaster experience as a positive one (Hewitt, 2005). In many cases, decentralization of power assists in reducing vulnerability (Fraser & Mabee, 2004), as this process turned communities from being dejected and vulnerable to feeling enthusiastic and empowered (Hazel, 2009).

2.2 Inclusion and Exclusion Criteria

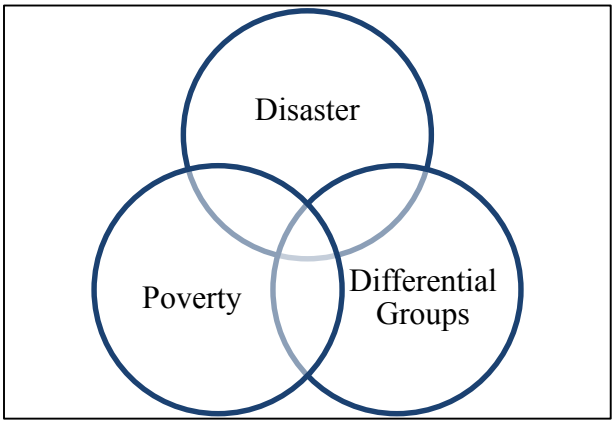

Figure 2: Inclusion and Exclusion Criteria

In analyzing how social units interact with the difficulties affected by disasters, we must not look by a hair's breadth at the disasters themselves but must consider a larger picture of social, economic, and political factors (Bolin & Stanford, 1998b; Hyogo Framework, 2005; K. J. Tierney et al., 2001). This

literature review encompasses existing theories and studies at the intersection of disaster and poverty with differential groups, namely, the poor, female population, children and elderly population, people with disabilities, unemployed, people with less formal education, different ethnic minorities, and immigrants. In some cases, the interaction of two (as shown in the Figure 2) has also been discussed considering relevance to the study. The previous studies concerning social, political, and economic environment in which disaster and poverty affects differently to disadvantaged groups has also been reviewed. A study that solely discusses on disaster, poverty, or differential groups has been excluded from the literature review. Mostly the studies conducted in the context of the United States have been reviewed. However, in some cases studies on other countries have also been reviewed based on their theoretical importance and relevance to the US context.

2.3 Theoretical Frameworks

Although much research and planning focuses on restoring order, sociologists and disaster scholars have increasingly viewed disaster situations from multiple locations and histories, often using systems theory as a perspective that exemplifies the dynamic seamlessness of past, present, and future economic frameworks and social actions (Iversen & Armstrong, 2008). Different theoretical paradigms of disaster research are discussed in the sections that follow.

2.3.1 Poverty theories

Poverty and poverty reduction are currently the central concerns of development dialogues and policy (Zebrowski & Howard, 2005). Despite recent theoretical advances, poverty analysis continues to be dominated by an income or consumption conception of poverty. In reality, poverty dynamics are intertwined with the forms of social relations that produce poverty, which are embedded within political institutions and economic structures (M. Green & Hulme, 2005). There are three broad explanations of poverty: (1) culture of poverty; (2) structural; and (3) fatalistic (Fothergill, 2003):

Table 1: Explanations of Poverty

Theories	Concepts
Culture of Poverty	According to Oscar Lewis (1914-1970), the most noted theorist in this area, the poor encounter unique problems due to the conditions of poverty, when compared to the non-poor, which leads the poor to develop a unique lifestyle.
Structural	Structural explanations stress the role of the economic and social conditions of capitalism in the creation of poverty, such as low wages, unequal educational opportunities, and discrimination.
Fatalistic	Fatalistic theory focuses on the circumstances out of one's control, including illness, bad luck, or a natural disaster.

2.3.2 Social Paradigms

Disasters are enthralling social phenomena. Sociological research not only recognizes what goes on when disasters hit but pays attention to occurrences that can extend sociological concepts of human behavior and social organization (Elliott & Pais, 2006; Rodríguez, Quarentelli, & Dynes, 2007). During a disaster, the origins and transformation of social structure need to be observed closely (Hewitt, 2005; Kreps & Bosworth, 1993). Social paradigms of disaster include a structural-functional system, a social construction process, a hazard-based model, and a structural vulnerability model. These have served as the predominate paradigms for disaster research in American sociology (Brunsma & Picou, 2008). However, disaster management scholarship is moving away from mainstream sociology, to the detriment of both (Quarantelli, 2005; Stallings, 2002; K. J. Tierney, 2007). Max Weber's political sociology contains a conflict model focusing on the structured inequalities of class, status, and power; thus, Weber's political sociology is one way to reconnect disaster research with longstanding concerns of the sociological discipline (Stallings, 2002). A positive change in recent sociological studies can be explained by numerous critiques of traditional ways of conceptualizing and explaining disasters: 1) greater acceptance of constructivist formulations; 2) willingness to acknowledge that disasters are convoyed by both social solidarity and social conflict; 3) acknowledgment of the importance of the interaction of disasters and risk with gender, class, and other axes of inequality (K. J. Tierney, 2007).

Table 2: Sociological theories of disaster

Theory	Considering factors
Structural-functional systems	Views disaster through a macro-level social arrangement which is an extensive focus on the social structures that contour society as a whole, and posit that society has transformed into a complex system like organisms.
Social construction process	Views disaster through social change and vulnerability
Hazard-based model	Views disasters in terms of society and community vulnerability and the identification of resources that promote or hinder patterns of social resiliency
Structural-vulnerability paradigm	Incorporates concerns of social structural inequality that relates class, race, ethnicity, gender and poverty as organizing concepts for understanding and predicting disaster effects and subsequent differential patterns of collective recovery

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2.3.3 Development Paradigm

Disaster damage is not solely a function of nature but is driven by the scale and type of human development, which is influenced not simply by what is built, but where a disaster unfolds within an ecological system (Brody, Zahran, Highfield, Grover, & Vedlitz, 2008). This socio-economic development has potential to counterpoise the rising effects of extreme weather events (Patt et al., 2010). Creating a single framework that incorporates disaster and development paradigms is important to conceptualize policy paradoxes of poverty and disaster risk reduction (Manyena, 2012). Although such integration of disaster and development into a single framework is a relatively new challenge, Sen's theory of entitlement, the pressure

and release model, as well as the sustainable livelihoods framework and policy guidelines like the Hyogo Framework, are among conceptual efforts that have brought the dual paradigms closer (Manyena, 2012).

2.3.4 Sustainability Paradigm

Natural disaster risk reduction has found its place in the progressively popular goals of sustainable development (Cutter et al., 2008; Van Riet, 2009). Although disaster-resilient community and sustainable hazards mitigation concepts offer many unique advantages for disaster scholarship, they are insufficiently address the activating agents, functional areas, actors, variables, and disciplines concerning calamitous events (McEntire, Fuller, Johnston, & Weber, 2002). A major challenge for contemporary societies is to respond to disasters in ways that create just and sustainable resilient environments, revere human rights, and create economic, social, and cultural well-being in realistic timeframes and at judicious costs (Howitt, Havnen, & Veland, 2012). Focusing on sustainability can enhance community coping capacity and lead to poverty reduction, reducing the adverse impacts of disaster (I. Kelman & Mather, 2008; Manyena, 2006).

2.3.6 Environmental justice paradigm

The environmental justice framework helps the researcher in identifying the basic assumptions that may contribute to our understanding of the differential and unequal protections of emergency planning, and evacuation of an environmental disaster. Environmental justice provides a tool for examination, analysis, and critique of the basic racial and social inequalities related to natural disaster (Johnson, 2008). Hurricane Katrina prompted discussions about environmental injustices and disproportionate suffering among poorer populations (Colten, 2007). Global warming, widely accepted as a cause of increasing natural disasters, is an issue of environmental justice. A just society should be able to address the ways a hydro-meteorological disaster becomes a social disaster (Roberts & Parks, 2009).

2.3.7 Ethical Paradigms

Ethical paradoxes and dilemmas associated with disaster management are profound (Varghese, 2010). The ethical paradigm of disaster management is grounded in the contrasting theories of human nature of Thomas Hobbes and John Locke. Locke believed that we are cooperative and peaceful by nature, whereas Hobbes believed that we are competitive and aggressive by nature, a tendency which makes us dependent on government for an orderly society in postdisaster situation (Zack, 2009).

Ethics is fundamental to political, social, and economic decision making. Indeed, ethical dilemmas have created polemic and heated debate over the years (Geale, 2012). Even a mass casualty situation can instigate specific ethical challenges (Geale, 2012). There are different ways to conceptualize and measure need for disaster aid in terms of suffering, primary goods, vulnerability or capabilities. Different measures are likely to generate different deductions about the need for emergency aid; for instance, a Rawlsian might view need the need for protection against sexual violence more than needs related to resource deprivation, while a virtue ethicist might argue that needs associated with poverty are as severe as those associated with physical security (Rubenstein, 2007).

Social responsibility toward those who are suffering from natural disasters cannot be discretionary; rather it is obligatory for societies to avoid the travesty of treating some persons as less worthy of help than others (Nickel & Eikenberry, 2007). Some fundamental virtues of disaster response are prudence, courage, justice, stewardship, vigilance, resilience, self-effacing charity, and communication (Geale, 2012). Ethical attitudes toward disaster survivors require incorporation of knowledge about ethnic culture, religious creeds, and human rights (Pandya, 2010; Varghese, 2010).

2.3.9 Disaster capitalism paradigm

In the aftermaths of Hurricanes Katrina and Rita on the American Gulf Coast, investigative journalist Naomi Klein called attention to the phenomenon of 'disaster capitalism'. According to Klein, disaster and conflict have become alibis for radical restructuring (Klein, 2007). The reconstruction after Katrina turned the Gulf Coast, especially New Orleans, into a laboratory for privatization. This is what Naomi

Klein calls “disaster capitalism” (Luft, 2009; Owen, 2011). The national and international responses to disaster resembles a kind of neo-imperialism, because national and international ruling classes are interested in accumulating capital from whatever ecological and social terrain they encounter (Keys, Masterman-Smith, & Cottle, 2006).

2.4 Conceptual Framework

Vulnerability has been emerged as one of the main critical concepts in disaster scholarship (McEntire, 2001; Vatsa, 2004; Vogel, Moser, Kasperson, & Dabelko, 2007). Vulnerability can be classified in a generic way on the basis of access to resources, in particular, household resources, economic and material resources, human and personal resources, family and social resources, and political resources (e.g., power and autonomy) (Coppola & Maloney, 2009; Degg & Chester, 2005). The concept of vulnerability has some holistic advantages in contrast to most other efforts of capturing past human poverty (Marie-Christine, 2006), and so vulnerability management paradigm is better suited to guide scholarly and practitioner works to apprehend and moderate disasters than other perspectives (McEntire et al., 2002). Susceptibility to disaster involves the complex interplay of a range of political, physical, social, cultural, and economic factors that generate different types of vulnerability in different social and environmental settings (Degg & Chester, 2005; Rudenstine & Galea, 2012; Wilder & Morris, 2008).

Disaster vulnerability is closely related to the socio-economic conditions (Morrow, 1999; Nicholls, 2011; Vatsa, 2004; W. Neil, 2006) that diverges from individual to individual, group to group, and community to community (Mallick, Khan Rubayet, & Vogt, 2011). Specific communities with a narrow economic base may become particularly vulnerable to the onset of a disaster (S. H. Ali, 2002; Zahran, Brody, Peacock, Vedlitz, & Grover, 2008). Vulnerable populations are often defined by personal, physical, or social characteristics (Forgette, Dettrey, Boening, & Swanson, 2009). Personal attributes include individual’s socio-economic status, employment, disabilities, language limitations, and age, whereas physical vulnerabilities may include the housing status and quality, or availability of personal transportation (F. L. Edwards, 2009; Forgette et al., 2009). Households with better resources can resist and cope with adverse consequences of disasters and other risks through the assets that they can mobilize in face of shocks (Vatsa, 2004).

Natural disasters are socially constructed (Bankoff, 2001; Morrow, 1999; Weichselgartner, 2001), and social vulnerability starts from social factors that place people in highly disadvantaged areas, affect the sensitivity of people to that exposure, and influence their capacity to respond and adapt (Brent, 2007; Wisner, Blaikie, Cannon, & Davis, 2004). Although there is no consensus within the social science community about social vulnerability or its correlates, it is unanimously accepted that social vulnerability is a multidimensional concept that aids to identify those physiognomies and experiences of communities and individuals which empower them to respond to and recover from natural hazards (S. L. Cutter, B. J. Boruff, & W. L. Shirley, 2003). The concept of social vulnerability identifies sensitive populations that may be less likely to respond to, cope with, and recover from a natural disaster (Cutter & Finch, 2008). By replacing "natural" disasters with social and ongoing conditions that produce daily risk, suffering, and trauma, social vulnerability scholarship has helped to understand how the intersection of class, race, gender, sexuality, disability, age, and other forces of systemic oppression exacerbate lives of those people in the onset of a disaster (Luft, 2009).

Natural disasters do not affect all people equally. The impacts of disaster are conditional on the vulnerability of affected people that can and often do systematically vary across economic class, ethnicity, gender, physical frailness, living below sea level, not owning a vehicle and other factors (Neumayer & Plümper, 2007; Wiener, 2007). Vulnerability approach to disasters suggests that inequalities in exposure and sensitivity to risk as well as imbalances in access to resources, capabilities, and opportunities systematically disadvantage certain groups of people, making them more vulnerable to the adversities of natural disasters (Neumayer & Plümper, 2007). Societal context in which a hazard exists has been focused on the Alexander's six-point typology of disaster vulnerability (Özerdem, 2006):

Table 3: Alexander's six point vulnerability

Vulnerability	Theme
Economic Vulnerability	When a disaster occurs, a further loss of livelihoods is incurred
Technological/Technocratic vulnerability	Different levels of loss absorption between the rich and the poor, urban and rural populations, rich and poor countries, ruling elites, and those in socioeconomic peripheries.
Residual vulnerability	With regards to technocratic vulnerability, if pre-code buildings, for example, are not upgraded because of a lack of political will and funding, this creates residual vulnerability.
Newly generated vulnerabilities	Societies may be affected by newly generated vulnerabilities as a consequence of human migration or emergent and previously un-experienced hazards.
Delinquent vulnerability	The deliberate neglect of safety norms, building codes, and regulations results in delinquent vulnerabilities.
Total vulnerability	Although the occurrence of disasters is frequent and devastating, in relation to poverty some societies may be facing total vulnerability because of the precariousness of life in general.

Although the term 'vulnerability' has many meanings, it expresses a key function of poverty, which is related to many other variables (Kleinen, 2007; Wisner, 2001). Poverty reduction is an indispensable component of reducing vulnerability to natural hazards because poverty is both a condition and determinant of vulnerability (Thomalla, Downing, Spanger-Siegfried, Han, & Rockström, 2006). Reciprocally, vulnerability and poverty are the cause and consequence of each other (Marie-Christine, 2006). Although linking vulnerability to poverty seems sensible, the interaction between these two concepts is difficult to differentiate as they interact with each other forming a vicious circle in which they reinforce each other (Marie-Christine, 2006).

2.5 Disaster Impacts on Differential Groups

Disasters have different impacts on diverse population groups. When the forces of nature exceed a person's ability to avoid or survive those forces, disasters become more devastating (K. Davies & Higginson, 2005). Disasters tend to impact more ruthlessly on those already disadvantaged, for example, Hurricane Katrina stroke hardest on those who were unable to evacuate from the city (Scanlon, McMahon, & van Haastert, 2007). Consequently, injury, morbidity, and mortality were disproportionately endured by African American communities, renters, unemployed persons, and the poor (Catalani et al., 2012).

2.5.1 Low-income population

Several qualitative studies have explained the linkages between poverty and disasters regards to certain type of disaster in a particular community (Flint & Luloff, 2005; M. M. McMahon, 2007). These studies describe how poor people are more exposed to natural disasters and extreme weather events than the non-poor (E. Ali & Talukder, 2010; Billon & Waizenegger, 2007; Boulle, Vrolijks, & Palm, 1997; Bouwer & Aerts, 2006; Doherty & Clayton, 2011; Kim, 2012; Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008; T. O'Dempsey, 2009; Sanderson, 2000). The poor are physically vulnerable because they tend to live in hazardous areas, such as gullies or coastal areas that are predisposed to disaster; and economically vulnerable because disasters devastate their households' natural, physical, and social assets (Iuchi & Esnard, 2008; Norris et al., 2008; Smith, 2012). They are more likely to experience stress, anxiety, isolation, disruption, displacement, depression, and feelings of powerlessness ((M. L. K. Edwards, 1998). As the poor being the most affected, there is a strong correlation between disaster and poverty due to the exposure to physical and economic vulnerability (Iuchi & Esnard, 2008; World Bank, 2012). They face greater restrictions in physical abilities, have fewer social contacts, experience more trepidation about area hazards, and possess inadequate resources for preparedness and response actions (Allison, 2012; Phillips, Metz, & Nieves, 2005; Shaw & Goda, 2004).

Although there is a lack of quantitative studies, many anecdotal and qualitative studies based on limited geographic boundaries have argued that disaster impacts are unequally distributed in affected communities varies according to their income composition (Forgette, King, & Dettrey, 2008; Zahran et al., 2008). In the United States, socioeconomic status is a significant predictor in disaster, because the poor people are more likely to identify hazards as precarious events, less likely to prepare for hazards or buy insurance, less likely to respond to warnings, more likely to die and suffer injuries, proportionately greater material losses; have more psychological distress, and face more complications during the stages of response, recovery, and reconstruction (Fothergill & Peek, 2004; Harper, 2005). Poor people face double jeopardy during disaster, as they already victims of poverty and further victimized in disasters (Norris, Baker, Murphy, & Kaniasty, 2005). However, classism makes the middle class distance themselves from the poor and they view the poor, working poor, and welfare recipients in the most negative light, because people on welfare are perceived as dishonest, uninterested in education, and dependent (Fothergill, 2003).

Morbidity and mortality are rampant among the poorer and disadvantaged segments of the society and they are always more vulnerable to various types of disasters (Kaur, 2006; Margaret M. McMahon, 2007; Pradhan et al., 2007; O. Rubin & Rossing, 2012). Research on the impacts of hurricanes, tropical storms, and tornadoes suggest that the poor communities suffer disproportionately in human fatalities and injuries (Zahran et al., 2008). For instance, after Hurricane Katrina many of the hardest-hit communities in New Orleans were among the poorest, and subjected to social glitches including a wrecked public school system, drugs, and gang violence (Campanella, 2006). Although there is a strong relationship between the size of a disaster and both fatalities and injuries, other socio-economic factors related to demographic distribution and poverty had induced significant casualties (Donner, 2007).

Several studies showed that the pre-existing socio-economic conditions play a momentous role in the capacity for a particular economic class to respond immediately to the disaster and to cope with the devastations in recovery phases (Fradin & Fradin, 2010; Levitt & Whitaker, 2009; Masozera, Bailey, & Kerchner, 2007). For example, more than a third of New Orleans residents were living in poverty before Hurricane Katrina (Catalani et al., 2012; Comfort, 2006). Poverty and a resource inaccessibility make people vulnerable to natural disasters, because the poorest of the poor have fewer choices, less insurance coverage, fewer possessions to liquidate, have more problems finding loans, and have greater dependency ratios in labor migration (Zamani, Gorgievski-Duijvesteijn, & Zarafshani, 2006).

Despite warnings to leave an impending disaster, public transportation systems were extremely limited in hard-hit areas prior to the Hurricane Katrina and many people of the poorest communities did not own private vehicles (Brodie, Weltzien, Altman, Blendon, & Benson, 2006; Colten, 2006; Comfort, 2006; Eisenman, Cordasco, Asch, Golden, & Glik, 2007; Litman, 2006; Margaret M. McMahon, 2007; Redlener, 2008; Sastry, 2009; Spence, Lachlan, & Burke, 2007). It is argued that nothing foretold death as much as the inability to get the transportation required for leaving the city in time (Wiener, 2007). This challenge indicates the intersection of natural disaster with the complexity of poverty and its effect on the community, especially the powerlessness of the poor who lacked transportation to leave for a higher ground (Cunnigen, 2006).

In conjunction with income and owning a private vehicle, one of the significant predictors of pre-storm evacuation of New Orleans populations was awareness of the evacuation order (Brezina, 2008). Poor people are least likely to have access to authentic information ahead of a disaster and least likely to have a dwelling they can go to and stay for days or weeks (Sastry, 2009; Seager, 2005). Often in evacuations, the poor may be at a disadvantage in terms of disaster preparedness due to unemployment, lower incomes, and fixed-finances that preclude specific preparedness behaviors, consequently they are severely affected (Spence, Lachlan, & Burke, 2007). Other factors influencing evacuation decisions of Hurricane Katrina victims were ethnicity, ties with family, friends, and community, access to shelter, and perception of evacuation messages where poor people lacked capacity and support (Eisenman et al., 2007), because socially and economically disadvantaged groups are very often too overstrained to provide sufficient assistance to other community members in time of further necessity (Norris et al., 2005).

Disasters intensify poverty and amplify poverty's tragic consequences (J. C. Mutter, 2008; Satterthwaite, 2003). Hurricane Katrina forced hundreds of thousands of low-income Gulf Coast residents to evacuate throughout the United States, and many of them are still, years later, struggling to reconstruct their lives (Bell, Madden, Borah, Lein, & Beausoleil, 2010). It is obvious that the lower the socioeconomic status of a victim's family, the less likely that family are reestablish a normal lifestyle equivalent to that lost in the disaster (Bolin, 1976). A survey on the evacuee populations of New Orleans revealed that 39% of respondents, which is equivalent to approximately 50,000 households, mostly poor, did not intend to return to the city (Campanella, 2006; Finch, Emrich, & Cutter, 2010). Neighborhoods of concentrated poverty in New Orleans were unappealing to return for many poor people who experienced improved neighborhood settings, occupational opportunities, schools, and amenities in their new locations (J. W. Mills, 2009; Sastry, 2009). In the post-Katrina situation, preexisting social disruption were amplified, many latent social and cultural discriminations were intensified, and demographic changes were occurred. Many assistance and reconstruction were disproportionately benefited the wealthy and the white; thus exacerbated the pre-existing socioeconomic discriminations that intensified the disproportionate impacts of Hurricane Katrina on the poor (Petterson, Stanley, Glazier, & Philipp, 2006). Aftermath of Hurricane Katrina, the percentage of residents with high income and high education were increased, but the percentage of residents with low income and low education were decreased in New Orleans (Groen & Polivka, 2010).

Housing damage was one of the major factors in decelerating the return of displaced New Orleans residents, particularly among the populations with low socioeconomic status (Fussell, Sastry, & VanLandingham, 2010). The historical trend of social injustice and economic inequality in New Orleans imperil the poor and working-class people to the thrust of Katrina's destruction and diluted their capability to reconstruct their own lives in the hurricane's aftermath (D. K. Taylor, 2009). The condition of the poorest exacerbated during the reconstruction period, because coping struggles of the poor were more irreversible in terms of investing in domestic assets, selling indispensable means of production, and migrating to distant locations for longer duration (Belle, 2006; Zamani et al., 2006). Low-income homeowners needed more assistance to reconstruct their lives than that of the wealthy homeowners (Elliott & Pais, 2006).

The poor and the minorities are less likely to derive benefit from support networks as their social capitals are less resource-endowed and less likely to be linked to grander societal resources (Zamani et al., 2006). As a result, the poor communities need more support that only well-prepared communities and institutions can deliver (M. J. Harris, Powell, & Stampely, 2007; Karanci, Aksit, & Dirik, 2005; J. K. Levy & Gopalakrishnan, 2005; Lichterman, 2000; Paton et al., 2008). In reality, the poor are less likely to obtain material and financial assistance from the government which restrict their recovery and increase the vulnerability toward emotional disruptions (M. L. K. Edwards, 1998). Not only after Hurricane Katrina, but also after the Northridge earthquake, many federal programs were targeted for homeowners. Loans were accessible to those who had the knowledge, skills and time to work through the application processes, and loans were largely unobtainable for the poor homeowners and lower-income renters (Bolin & Stanford, 1998a). In addition, the negative impacts of 1993 Midwest flood were significant and long lasting to the poorer communities (Xiao, 2011). Social stratification based on race and class affects the level of response to hurricanes which is also evident from the historical examples of differential treatment in emergency preparedness during Hurricanes Gustav and Ike (Cutter & Smith, 2009).

Although poverty and vulnerability to natural disasters should not be considered as synonyms, it is certain that some characteristics, resulting from the economic, social, political, and cultural system diminish or eradicate equal access to opportunities, and therefore results in an increase of vulnerability (Hall, Duit, & Caballero, 2008; Irasema, 2002). At the household level, poverty is regarded as the single most important

factor determining vulnerability, because the poverty-exacerbating nature of vulnerability is attributable to post-disaster related devastation, temporary forfeiture of income generating prospects, and increased indebtedness (Huigen & Jens, 2006). Disaster victims whose houses are severely damaged by the disaster are susceptible to poverty, which implies that the disaster affects the households from two facets. Firstly, some people have to maintain and repair the wrecked houses, and therefore unable to work outside, which leads to decrease in income and heightened vulnerability. Secondly, the vulnerability of people whose houses are more severely damaged tends to increase, because disaster damages part of their fixed asset for living and manufacturing (Sun, Chen, Ren, & Chang, 2010).

According to the disaster communication studies, the media played an important role in disseminating information during Hurricane Katrina, but they overlooked the structural dimension of disaster and poverty, and promulgated the pre-existing prejudices in many cases (Voorhees, Vick, & Perkins, 2007). New Orleans was represented as a symbol of disorder. The major news network portrayed images, narratives, and imaginaries of the poor as either despondent victims or as the source of the social problems they endured (Camp, 2009). Inadvertently, the media coverage of Hurricane Katrina had swerved attention from systemic determinants of poverty by concentrating on isolated cases of crime and antisocial behavior (Belle, 2006). In the Superdome sports stadium, urban poor, one of the most vulnerable populations in the United States, were left stranded without even the basic necessities of life, while the mass media highlighted stories about looters who were stealing guns, alcoholic drinks, sneakers, athletic wear, and electronics (Cole, 2005; Comfort, 2006; Miles & Morse, 2007). Media often highlight that a disaster brings out the worst in people, such as looting and rioting; however, in reality most people respond positively and generously (Gittelman, 2005; Jacob, Mawson, Payton, & Guignard, 2008; Mason, 2011; K. Tierney, Bevc, & Kuligowski, 2006).

The vulnerability of the poor is increased by their spatial choice in the onset of a disaster. An inefficient land management encourages the poor to form scattered settlements in hazardous places without adequate forms of protection and make them prone to the uneven exposure to hazards (Alam & Collins, 2010; Klinenberg, 1999; Levine, Esnard, & Sapat, 2007; Marshall, Picou, & Bevc, 2005; Myers, Slack, & Singelmann, 2008; Parr, Boyd, Harriott, & Torrence, 2009; Pinera & Reed, 2007; Plyer, Bonaguro, & Hodges, 2010; Taylor, 2006). The poor are more likely to occupy property on the most hazardous

inexpensive lands, such as hillsides, floodplains, floodways, and to live and work in structures that are unlikely to endure the shock, experience damage, and temporary, and possibly permanent relocation (Briceño, 2004; Cutter, 2001; Gerber, 2007; Loucks, Stedinger, & Stakhiv, 2006; Lucchi, 2012; Manuel-Navarrete, Gómez, & Gallopín, 2007; J. Mutter, 2010; Spence, Lachlan, & Burke, 2007). The poor living in informal settlements are incapable of benefiting from governments' regulatory and zoning codes (Kahn, 2005). In contrast, wealthier people can afford to live in safer communities and are more likely to be educated and better able to process and to react to the information and warnings of an upcoming shock (Assanangkornchai, Tangboonngam, & Edwards, 2004; Bullard, 2008; Burningham, Fielding, & Thrush, 2008; M. L. K. Edwards, 1998; Kahn, 2005; Wilson et al., 2008).

In case of the United States, poorer communities in the Gulf Coast states of Alabama, Florida, Louisiana, Mississippi, and Texas, are living with high disaster risks and are at a greater disadvantaged than that of the more affluent. Federal subsidies for disaster insurance encourage the rich to build in lovely but dangerous places, such as the Gulf Coast and the Florida coast, earthquake-prone areas, the exquisite valleys and hillsides in the fire-prone and landslide-prone areas, whereas the uninsured poor settle close by to serve them, and become more vulnerable to disaster (Perrow, 2008).

2.5.2 Female population

In terms of both impacts and capabilities to reduce vulnerability, gender is repeatedly an unseen dimension in disaster scholarship despite general recognition within social sciences that there exists a gendered dimension to the responses to any social event (Basher, 2008; Cupples, 2007; Enarson & Meyreles, 2004; Seager, 2005). In recent years several studies has focused on how men and women are affected and respond differently during disasters (Cupples, 2007; Enarson, 1998; Ginige, Amaratunga, & Haigh, 2009; Horton, 2012; Ikeda, 2009; Oxfam, 2010; Rao, 2006; West & Orr, 2007). If gender were regarded as a "natural" fact, questions concerning the stability and resilience of the gender order following a disaster would not arise; however, once one concedes that gender is a social construction, one must look to social factors to explain its importance (Always & Smith, 1998).

Disaster fatalities are seldom gender neutral (Enarson & Chakrabarti, 2009; Neumayer & Plümper, 2007), and survival rates of women are much lower than men in many disasters (Basher, 2008; Buckingham,

2004; Eiinder & Erixson, 2012; Felten-Biermann, 2006; Guha-Sapir, van Panhuis, & Lagoutte, 2007; J. C. Mutter, 2008; Nishikiori et al., 2006; Pradhan et al., 2007; Seager, 2005, 2006). Based on sample of 141 countries over the period from 1981 to 2002, Neumayer & Plümper (2007) found that natural disasters lower the life expectancy of women more than that of men which means on average natural disasters and their succeeding impacts kill more women than men or kill women at an earlier age than men. The impact of disasters on the gender gap in life expectancy is negatively associated with the socio-economic status of women. Female mortality rate is higher in disasters not because women are physically weaker, but because of male-dominated social structure, underpinned by cultural traditions (Begum, 1993; F. L. Edwards, 2009; Lewis, 2006; Norris et al., 2005; Rashid & Michaud, 2000). The expectation that a woman will look after the elderly, and having numerous children hold her back from saving her own life without considering other household members (Begum, 1993; Kotze, 1996). As a result, socially constructed gender-specific vulnerability of females assembled into everyday socioeconomic forms lead to comparatively higher female disaster mortality rates relative to men (Neumayer & Plümper, 2007).

Women are amongst the most vulnerable population groups because they are generally poorer than men, have less access to and control of resources, and many cultures and jurisprudence might have restricted their means to become independent and take up the position of power (Cambron, Acitelli, & Pettit, 2009; Cannon, 2002; Covan & Fugate-Whitlock, 2010; Kotze, 1996; Wisner & Luce, 1993). Poverty leaves people more vulnerable to disaster that amplifies by the ideologies about gender (Jones-Deweever & Hartmann, 2006; Saroor, 2010; Seager, 2005, 2006). Poor women can hardly afford quality housing located on raised ground, adequate storage of food which are crucial for self-protection (Cannon, 2002). A poor woman might die or be injured in a disaster because not only she lives in a flimsy shack on marginal and unstable land, but also, in all likelihood, they might consume inadequate diet and work irregularly for little pay (Rigg, Grundy-Warr, Law, & Tan-Mullins, 2008). Unless poverty is abridged, the increase in disasters and extreme weather events linked with climate change is likely to affect women more than men, because being female is strongly linked to being poor (Cannon, 2002; Reed & Christie, 2009).

Female-headed households are more likely to have inadequate preparation for a disaster and may need more and dissimilar assistance after a disaster (Zottarelli, 2008). In female-headed households, the

ability of women to create safe conditions in the face of impending floods or hurricanes is reduced due to poverty that affect people's ability to provide adequate self-protection (Cannon, 2002; Waite, 2000). Female-headed households are underprivileged, not because of unfairness against them in disaster damage or relief, but because of gendered division of labor (Takasaki, 2012). Women, particularly poor and minority women, experience a disproportionate costs associated with disasters (Forrest, 1999; B. L. Levy, 2012).

Domestic activities are strongly gendered (Degg & Chester, 2005; Felten-Biermann, 2006; Stehlik, Gray, & Lawrence, 2000), where invisible domestic workers, mostly women and girls, perform domestic chores in urban middle-class and poor households (Jauhola, 2010; Thurnheer, 2009). As a result of gendered roles, which might be very different and rigid or overlapping and fluid, men and women experience different vulnerabilities and have different capacities in societies (Anderson, 1994a; Ruwanpura, 2008; Seema, 2011; Steckley & Doberstein, 2011). Even during the worst storm, gender roles and expectation only briefly suspended, if at all (Always & Smith, 1998). Women are responsible for larger share of domestic and child-rearing work than men in the home and women also have a greater emotional attachment to their home than men, given that their lives became much more difficult after a disaster (Aksaray, Kortan, Erkaya, Yenilmez, & Kaptanoğlu, 2006; Samuels, 2012). Women may take on the role of looking after others even before they are ready to access relief centers and may themselves require support with childcare and household work (Rao, 2006; Steckley & Doberstein, 2011). Women's various roles as reproductive, productive, and community workers, as well as particular cultural values and traditions put different pressures on them in times of disaster (Cupples, 2007; Kotze, 1996; Stehlik et al., 2000).

Preparations for the hurricane and activities in the aftermath are clearly organized along gender lines where males are viewed as the protectors and providers, and they assumed more responsibilities outside the home, literarily and figuratively. Women are viewed as the nurturers and comforters, and they took on more of the "inside" responsibilities, including physical and emotional work (Always & Smith, 1998; Samuels, 2012). In some instances after Katrina, men neither made intensive effort to communicate or care for their children, nor they offer to provide financial or emotional consolation for their children's mothers (Peek & Fothergill, 2008). This emotional stress led to many female evacuees to have increased alcohol, tobacco, and illicit drug use (Cepeda, Valdez, Kaplan, & Hill, 2010).

Several disaster studies recurrently document disproportionate effects on women and girls with respect to health and safety, income, social power, human rights, and life (Callaghan et al., 2007; Emily W. Harville, Xu, & Buekens, 2009; Seager, 2006; Soeteman et al., 2008). Due to women's relative lack of power and control in society, they tend to view disaster threats as more risky and they are also more likely to respond to calls for evacuation in comparison to their male counterpart (Brezina, 2008; J. S. Brown et al., 2010; Covan & Fugate-Whitlock, 2010). Probably this intensity of awareness is linked to differences between women and men as well as the high numbers of female casualties in disasters (Ripley, 2009; Thurnheer, 2009). Stigma affected women when they have to accept charity, especially when women accept charity for the first time in their lives. Women on welfare are most demonized due to the localized culture and preconceptions about poor people (Fothergill, 2003, 2004; Horton, 2012).

Women are disproportionately disadvantaged in both chronic and catastrophic environmental hazard situations compared with men (Cupples, 2007; O. A. Davis & Land, 2006), because violence against women escalates in high-stress circumstances (Buckingham, 2004; Felten-Biermann, 2006; Flett, Kazantzis, Long, MacDonald, & Millar, 2004; Lucchi, 2012). Gender-based violence escalates after many disasters, including Hurricane Katrina, where significant numbers of rapes have been reported by survivors but overlooked by the government agencies, which reify a hegemonic masculinity that is predicated on propensity to be violent and to dominate or own one's environment, relationships, and possessions (K. L. Harris, 2011; Horton, 2012; Luft, 2008; Seager, 2006; Thurnheer, 2009).

The majority of literature has reported that females are more likely than males to develop posttraumatic stress disorder (PTSD) symptoms (J. S. Brown et al., 2010; Elklit, 2007; Flett et al., 2004; Heir & Weisæth, 2008; Kronenberg et al., 2010). In the study of mothers, the relationship between income inequality and depression was greater among those with low income (Ahern & Galea, 2006). The feminist-psychodynamic studies encompassing a developmental perspective on gender reveals that, generally older adolescent girls have more symptoms of depression and other mental problems than younger adolescent girls and boys in postdisaster situation (Bokszczanin, 2007). In contrast, Berger et al. (2012) found no association between gender composition and the prevalence of PTSD (Berger et al., 2012). Spatial displacement and becoming homeless from disasters represent a negative spatial shift in an individual's life, but for some

women it might bring freedom from a violent relationship, spiritual revitalization, and a renewed sense of optimism (Bradshaw, 2002; Cupples, 2007; E. W. Harville et al., 2011).

Several studies have also documented gender roles in postdisaster situation in the United States. After Hurricane Andrew hit South Florida, houses and businesses were destroyed, neighborhoods were leveled, the landscape was altered almost beyond recognition, jobs were lost, families were displaced, but the gender roles and responsibilities were barely and only briefly disturbed. (Always & Smith, 1998). In the wake of Hurricane Katrina, women were less likely to have a car or driving license than their male counterparts and poor African American women in New Orleans were least likely to have a car or access to one, consequently they failed to evacuate before the storm, and afterwards it affected all aspects of their daily lives, such as seeing a doctor, buying groceries, or applying for jobs or assistance (Peek & Fothergill, 2008; Seager, 2006). While mothers of all race and class backgrounds took on caregiving obligations in the wake of Hurricane Katrina, their involvements were certainly not identical, because low-income African American women confronted different, and often more challenges because they were more likely to be displaced to unacquainted places, to lack agency in that decision, and to have fewer possessions (Peek & Fothergill, 2008; Reed & Christie, 2009; Seager, 2005).

It was estimated that approximately 56,000 pregnant women were directly affected by Hurricane Katrina (Callaghan et al., 2007). They were exposed to threats by disruptions in the supply of clean water for drinking and bathing, lack of access to information and strategies due to loss of electricity, inadequate access to safe food, exposure to environmental toxins, interruption of health care, crowded conditions in shelters, and disruption of public health and clinical care infrastructure (Callaghan et al., 2007; J. W. Mills, 2009; Rotkin-Ellman, Wong, & Solomon, 2012; Tong, Zotti, & Hsia, 2011). In postdisaster situations, including but not limited to Hurricane Katrina, many women experienced maternal complications, as well as adverse birth outcomes such as preterm birth and low birth-weight of infants (Evans, Hu, & Zhao, 2010; Emily W. Harville et al., 2009; Leyser-Whalen, Rahman, & Berenson, 2011; Tong et al., 2011; Torche & Kleinhaus, 2012).

Feminist theorists have long illustrated the public invisibility of women, especially women of minority population groups (Luft, 2008; Macomber, Mallinson, & Seale, 2011), and the New Orleans case

study provides a dramatic example of the "not-noticing" of minority women in the observation of media (Seager, 2005, 2006). As elsewhere in the society, roles and behaviors in disasters are gendered. Disaster management remains a largely male-dominated, top-down process, where few women are involved in this official, bureaucratic process, and have inadequate decision-making power and local representativeness (Enarson, 1998; Fordham, 1998; Onuoha, 2008; Wisner & Luce, 1993). Disaster management programs need to consider gender if they want to reduce the overall risks to disasters (Forrest, 1999; Ginige et al., 2009; Jauhola, 2010; Kotze, 1996).

2.5.3 Children

A number of studies focused on vulnerability of children in disaster situation because of their physiological, psychosocial, and cognitive differences compared with adults (Belfer, 2006; Brandenburg, Watkins, Brandenburg, & Schieche, 2007; Guha-Sapir et al., 2007; Javaid, Arshad, & Khalid, 2011; Murray & Monteiro, 2012). Children's immature ability to understand and process the instantaneous and longstanding effects of emergencies, including their own injuries and exposure to troublesome events, traumatized or injured parents, loss of beloved ones, interruption of daily routines, and frightening images in the media, make them amongst the most vulnerable members of affected communities (Balaban, 2006; Becker-Blease, Turner, & Finkelhor, 2010). Children have unique needs (Belfer, 2006) and disasters disrupt their basic needs including access to food, water, accommodation, and principal caregivers (Becker-Blease et al., 2010; Javaid et al., 2011).

Becker-Blease and colleagues (2010) studied a representative sample of 2,030 American children aged 2 to 17 and found that disaster exposure was associated with some forms of victimization and adversity. Victimization was associated with depression among 2- to 9- year-old disaster survivors, and with depression and aggression among 10- to 17- year-old survivors. Poverty, parenting capacity, social support and many other stressful environmental factors may lead to maltreatment and victimization of children (Becker-Blease et al., 2010). Children are particularly predisposed to the messages and images seen on television (Belfer, 2006). Children are not only at risk of losing their lives, but also more vulnerable because many of them lose their guardians (Steckley & Doberstein, 2011). Moreover, it is difficult to separate the influence of age,

gender, and class, consequently the impact of disaster is more acute for girls (Pradhan et al., 2007; Wisner & Luce, 1993). Children with disabilities and special health care needs stance a special challenge in post-disaster response, because general populations are not adequately prepared for major disaster events, with members of vulnerable populations even less prepared at personal and family level (Baker, Baker, & Flagg, 2012; Berry et al., 2011; Peek & Stough, 2010).

Mental health problems among the children exposed to Hurricane Katrina were common and widespread (Demir et al., 2010; McLaughlin et al., 2009; Osofsky, 2008). Younger age groups are more likely to be diagnosed with adjustment disorder after a disaster, and those who had lost relatives, friends or neighbors, as well as whose residence were heavily damaged, were tended to be diagnosed mental disorders (Bhushan & Kumar, 2007; Demir et al., 2010; J. O. P. Diaz, 1999; Felix et al., 2011; Guha-Sapir et al., 2007; Kronenberg et al., 2010; Madrid & Grant, 2008; Pfefferbaum et al., 2010). Most commonly observed traumatic reactions in school-aged children include certain fears, separation problems, sleep difficulties, reenactment of the trauma in play, regression, physical complaints, irritability, survival guilt, deterioration in academic performance, anxiety of recurrence of the trauma, and trauma-related guilt (Barrett, Ausbrooks, & Martinez-Cosio, 2012; Kronenberg et al., 2010; Soeteman et al., 2008). Posttraumatic stress symptoms are associated with negative school performance and exposure for both children and adolescents (R. T. Jones et al., 2009; Şahin, Batıgün, & Yılmaz, 2007; Zubenko & Capozzoli, 2002).

Children's disadvantaged positions in society makes them at risk when it comes to being prepared for and responding to disasters which results in children suffering disproportionately when disasters strike (Bullock, Haddow, & Coppola, 2011; Burnham, 2009; Murray & Monteiro, 2012). Parents are essential in caring for children in emergency situations and in the aftermath of disaster (Peek & Fothergill, 2008), because children acquire sense of safety from the cues perceived from adults of their family (Madrid & Grant, 2008). When children experience the death of family members, friends, teachers, and others or are displaced from their homes, and community, they are susceptible to certain specific vulnerabilities (Belfer, 2006). In disaster situation children might be separated from family, therefore, quick identification of separated children as well as their reunification with family is indispensable to counteract secondary injuries, such as physical and sexual abuse, gender-based violence, exploitation, neglect, and abduction (Brandenburg et al., 2007; Javaid

et al., 2011; Ritchie, Watson, & Friedman, 2006) . Some studies have also focused on the importance of infant feeding in postdisaster situations (Callaghan et al., 2007; Emily W. Harville et al., 2009).

Different children affected in a different way, to a different degree, over a different time period (Aptekar & Boore, 1990; C. S. Brown, Mistry, & Bigler, 2007). For instances, poor households are more likely to use child labor and schooling reduction as strategies and use child earnings to pay for survival expenditures to cope with socioeconomic shocks aftermath of disaster (Vásquez & Bohara, 2010). Louisiana and Mississippi, two of the most affected States by Hurricane Katrina, were routinely cited as having the highest child poverty rates in the United States, for instance, approximately 20 percent of Louisiana's children lived in families with annual incomes below $10,000 (Redlener, 2008).

Adult Katrina victims were more likely to take appropriate preparations for the storm, because they had already taken essential precautions, such as the preparation of a supply kit, moving to a safer place (Spence, Lachlan, & Burke, 2007). Access to health care was also problematic with few children having regular access to a primary care medical home in Louisiana and Mississippi (Redlener, 2008). Even two years after Hurricane Katrina, children exposed to the storm had significantly lower odds of having a personal health care provider compared to unexposed children (Stehling-Ariza, Park, Sury, & Abramson, 2012).

2.5.4 Elderly People

In general, there is consensus in the social science hazards literature that age and vulnerability to disasters are interconnected (Basher, 2008; S. L. Cutter, B. J. Boruff, & W. Shirley, 2003; Degg & Chester, 2005; Langan & Palmer, 2012; Loke, Lai, & Fung, 2012; Pekovic, Seff, & Rothman, 2007; Steckley & Doberstein, 2011; Torgusen & Kosberg, 2006; World Health Organization, 2008). It is evident from the changing global demographics that in future years the proportion of elderly people will increase exponentially who might be exposed to disasters (Barratt, 2007). The larger the fraction of elderly in a community, the more vulnerable it is and the extended time it will take for the community to entirely recover from a disaster (Cutter & Finch, 2008).

Elderly people are accepted as among the most vulnerable people in disasters, because they tend to be less mobile and more easily trapped, confined, and injured than younger adults (Zhaobao et al., 2010).

Impaired physical mobility, diminished sensory awareness, preexisting health conditions and social and economic restraints increase the vulnerability of frail elderly people during disasters. During time of calamities psychological stress, social adversities, and higher mortality rates are experienced by the elderly people in the United States (Burnett, Dyer, & Pickins, 2007; Kates, Colten, Laska, & Leatherman, 2006; Langan & Palmer, 2012; Pekovic et al., 2007). Their vulnerability is higher because of physical constraints and declining cognitive abilities that amplify their powerlessness or unwillingness to comply with mandatory evacuation orders (Zottarelli, 2008).

Elderly populations are less resilient to acute trauma and capacity to cope with the long-term consequences of disaster, including relocation, underprivileged accommodations, crowded conditions and diminished admittance to health facilities (Ardalan et al., 2011; B. L. Green, 1998). The ailments of elderly persons, including but not limited to, heart disease, cancer, stroke, arthritis, poor vision and hearing, depression, and dementia. Elderly persons have difficulty obtaining necessary assistance due to physical and mental impairments, which worsened by limited income, fewer economic resources, inability to read or speak English, inadequate supports from friends and family members, and anxiety of traveling to the source of assistance (Cutter & Finch, 2008; Torgusen & Kosberg, 2006).

It was revealed in the study on elderly persons that the association between income inequality and depression was greater among those with more physical sicknesses (Ahern & Galea, 2006). When elderly persons adversely affected or evacuated by disasters and become victims of tornadoes, earthquakes, floods and hurricanes, certain characteristics of elderly victims, such as loss of a sense of belonging and personal disorientation, loss of familiar persons and things, are results in problems of spatial disorientation (Magkos et al., 2004; Torgusen & Kosberg, 2006). In conjunction with being elderly, having family members or friends utterly injured, having lost essential belongings, having felt culpability concerning one's death or injury, and having not utilized mental health amenities are independent risk factors for general psychological distress (Kohn, Levav, Garcia, Machuca, & Tamashiro, 2005; Zhaobao et al., 2010).

Along with different health and socio-economic factors, age affecting elderly people's ability to prepare for, respond to, and recover from a disaster and place them at greater risk (Allen & Nelson, 2009; Barratt, 2007; Chaudhuri, Gupta, Eisman, Jeung, & Le, 2008). Although the health and functional status of

elderly people is improving in many countries, the reality is that there is a subpopulation among elderly people who represent some of the most vulnerable people (Barratt, 2007; Loke et al., 2012). Further distresses in any natural disaster that intensify risk factors for elders include power outages that disturb life-support equipment (e.g., oxygen generator, wheelchair) and elevators (making emergency evacuation very challenging or even impossible); lack of social support and language and cultural barriers (e.g., lower reading aptitude, speaking difficulty); and commotion of entitlement program assistance, upon which many elders are completely dependent (Fernandez, Byard, Lin, Benson, & Barbera, 2002; Pekovic et al., 2007).

In many disasters the morbidity of elderly people is much higher due to their physical inability and dependence on family members (Basher, 2008; Steckley & Doberstein, 2011). Despite representing only 12 to 15 percent of the population affected by Hurricane Katrina, elderly people comprised 75% of the deaths (Hyer, Brown, Berman, & Polivka-West, 2006; Langan & Palmer, 2012). Elderly persons or others with limited means were more reluctant to evacuate in the wake of Hurricane Katrina (J. S. Brown et al., 2010). Moreover, the US heat wave of 1979 killed several thousand elderly people who were, however, not just old, but poor (Wisner & Luce, 1993).

Studies in context of Hurricane Katrina revealed that elderly people needed assistance with transportation, preparation, and support for serious health problems, as well as anticipatory emergency plan that includes a kit of essential medical supplies and information, important contact information, and relocation sites in order to evacuate (Rosenkoetter, Covan, Cobb, Bunting, & Weinrich, 2007). Moreover, frail elders with serious physical, cognitive, economic, and psychosocial challenges, utilize most of their functional reserve on daily survival, dealing with health conditions, economic constraints, social isolation, and impaired mobility, as a result, they are likely to have difficulty coping with additional stress and subsequently may be even more adversely affected by disasters than the general population (Pekovic et al., 2007). Such deficiencies also limit their ability to plan, respond, or seek help, and make them less likely to convalesce from the economic impact of a natural disaster (Basher, 2008; Pekovic et al., 2007).

2.5.6 People with disabilities

People with disabilities, including deaf, blind, mentally retarded, those with restricted mobility are more vulnerable in a disaster situation (Clear, 2007; Guha-Sapir et al., 2007; Tatsuki, 2012). The problem of disability has two faces; first, disabled people need special attention when disaster warnings and evacuation orders are given, because they may not hear or understand. Second, many disasters cause injuries that lead to long-term disability (Wisner & Luce, 1993). The financial burden of caring for the disabled is carried by families and local communities (Wisner & Luce, 1993).The vulnerability of children with disabilities to disasters are multifarious because their families' social context may be linked to social, structural, and financial deprivations (Boon, Pagliano, Brown, & Tsey, 2012; Save the Children, 2012).

Norris, Sherrieb, and Galea (2010) conducted a random population survey 2–6 months after Hurricane Ike struck Galveston Bay on September 13, 2008 and found associations of injuries with distress and disability. The results suggest that the potential efficacy of evacuation incentives with regard to the deterrence of disaster-related injury and disability (Norris, Sherrieb, & Galea, 2010). During Hurricane Katrina, many New Orleanians' mobility was limited by their family member's disability (Brodie et al., 2006). Without appropriate interventions, people with disabilities may be expected to show elevated poverty rates, longer exposure to hazards, and higher vulnerability in the context of traumatic loss or separation from caregivers (Kailes & Enders, 2007; Peek & Stough, 2010).

2.5.5 Ethnic minorities

Racial and ethnic communities in the United States are more vulnerable to natural disasters, because of factors such as housing quality, location, building structure, level of insurance, community segregation, and cultural insensitivities (Bullard, 2008; M. L. K. Edwards, 1998; Forgette et al., 2008; Fothergill, Maestas, & Darlington, 1999; Uttley, 2010; Wiener, 2007; Wisner & Luce, 1993). Race and ethnicity, are related to structural conditions, such as educational and employment prospects, the organization of family and kin systems, cultural preferences that shape an individual's worldview which subsequently influences how people perceive stressful events, view their need for support, and recognize resources that they deem appropriate for

managing their circumstances (Carp, 2007; Cline et al., 2010; M. L. K. Edwards, 1998; Elliott & Pais, 2006; Forgette et al., 2008; Hobfoll, 2012; Kaiser, Eccleston, & Hagiwara, 2008; Wyche et al., 2011).

There were several studies arguing whether to address class or race issues as many believe that the vulnerability of racial and ethnic minorities to disasters is mostly due to their economic status and resources. However, it is important not to dismiss issues of ethnicity as socioeconomic factors that cause marginalization of certain groups of people (Fothergill et al., 1999). "Class" depicts simply material relations which become more miserable when intersect with ethnic minorities in a disaster situation (Gavin, 2008; Hirsch, 2009). Moreover, race and class are inseparable as minority groups often have lower average incomes and poorer access to a variety of natural and social resources, such as education, legal representation, credit, insurance, and employment (Aldrich, 2012; Fothergill et al., 1999; Wisner & Luce, 1993). A survey on over 1,200 Hurricane Katrina survivors revealed strong racial and class differences, demonstrating that neither of these dimensions can be reduced to the other when investigating to understand responses by survivors themselves (Elliott & Pais, 2006; Sothern, 2007).

Hurricane Katrina brought the controversial topics of systematic racism and poverty of the United States to the forefront and being openly discoursed as national problems in the country (Gavin, 2008; Giroux, 2007; Haskett, Scott, Nears, & Grimmett, 2008; I. Kelman, 2007; W. Li et al., 2008; Scheper-Hughes, 2005; C. Taylor, 2009). As black communities lived in proximity of hazardous waste storage facilities and underground storage tanks, they were more vulnerable to the disaster even before the storm (Johnson, 2008). In New Orleans, the support for residential segregation and gentrification by blocs and the metropolitan region reflect that local politics and policies were defined by racial and class schisms (Woods, 2009). The black New Orleanians were rendered invisible as a class experiencing some of the most detrimental consequences of the United States in insistently unjust economic system (Mason, 2011; Thomas, 2009). Assessing the effects of Hurricane Katrina by applying the environmental racism-classism and residential segregation literatures demonstrates that elevation and the concentration of minorities are significantly associated with hurricane damage (Bullard & Wright, 2009; B. L. Levy, 2012; Luft, 2009).

Regrettably, ethnicity has played a pivotal role as far as evacuation, relief, recovery, and rebuilding efforts of the Gulf Coast States (Johnson, 2008). Cars are an essential part of emergency evacuation. While

only 7 percent of white households do not own a car, 24 percent of African-American households, 17 percent of Latino households, and 13 percent of Asian-American households do not own a car at national level (Bullard, 2008). When race intersects with poverty, the vulnerability increases. African-Americans who were wealthy enough to leave New Orleans or who lived on elevated ground were not more vulnerable than others, while whites who were unable to evacuate, although fewer in number, were as vulnerable as blacks in the same situation (Wiener, 2007). Blacks across the region were less willing to evacuate than whites before the storm, particularly because they unable to receive information from informal sources and disbelieved that the hurricane would be as shattering as it ultimately was (Elliott & Pais, 2006; Spence, Lachlan, & Griffin, 2007).

Over one million Gulf coast inhabitants from Louisiana, Mississippi, and Alabama displaced from their homes in the wake of Hurricane Katrina (Campbell, 2006). Even though both black and white hurricane survivors find themselves in similar circumstances, black population faced different experiences and challenges than whites in rebuilding their lives, homes, businesses, institutions, and communities (Bullard, 2008; Henkel, Dovidio, & Gaertner, 2006). Black workers from New Orleans were four times more likely than white counterparts to lose their jobs after the storm (Elliott & Pais, 2006) . Black New Orleanians were in a sequence of gaps of safety net in post-Katrina situation, and were uncared for at the most basic level in a time of emergency, because their households could not be self-supporting; and they could not reliably turn to the informal networks (Bullard, 2008; Forgette et al., 2008; Pyles, Kulkarni, & Lein, 2008; L. B. Rubin, 2008). As a result, black hurricane survivors more recurrently reported hurricane-related problems with personal health, emotional safety, and finances, and blacks were more likely than whites to report the loss of friends, families, and personal possessions (A. Becker, Dark, Mason, & Goodwin, 2012; Toldson, Ray, Hatcher, & Straughn Louis, 2011).

African Americans held noticeably different views about government response to Hurricane Katrina, even controlling for partisanship, income, and education. They believe that the federal government had done a sluggish responding to the storm because of victims being poor and black (Dach-Gruschow & Hong, 2006; Haider-Markel, Delehanty, & Beverlin, 2007; Hirsch & Levert, 2009; Nates & Moyer, 2005; Peiia, Bachman, Istre, Cohen, & Klarman, 2010). Even few years following Hurricane Katrina, black residents returned to the city at a much slower pace than white residents even after controlling for

socioeconomic status and demographic characteristics (Fussell et al., 2010; Groen & Polivka, 2010; Raeburn, 2007; Stringfield, 2010). Katrina is associated with significant shifts in the racial composition of the affected areas, as there was a decrease in the percentage of residents who were black (Groen & Polivka, 2010).

However, such demographic reorientation and discrepancies in aid distribution in the face of natural disaster is not new for the African-American community. The Great Mississippi Flood of 1927 and the Vanport Flood of 1948 in Oregon results in massive waves of African-American relocation where blacks and poor communities bore a disproportionate share of the environmental and economic risks of natural disaster as underwritten by discriminatory housing, job distribution, and rescue efforts (A. Kelman, 2003; Kish, 2009). In the case of Hurricane Andrew, the inadequate responsiveness was due mostly to economic capability and ethnic minority groups lacked economic endowment (Wilson et al., 2008). After the 1994 Northridge, California earthquake, particular class and ethnic groups in Los Angeles failed to obtain adequate relief in spite of the flow of US$ 11 billion in federal assistance (Bolin & Stanford, 1998a).

There are clear evidences that media coverage of Katrina was racialized and media framing of Katrina in terms of race leads to the development of a stronger affinity between African-Americans and the victims of the storm (Ben-Porath & Shaker, 2010; Gavin, 2008; Haider-Markel et al., 2007; Hartnell, 2009; Michael & Mulloy, 2008). An ample emphasis of media engaged in sexual assaults and violence ignoring institutional poverty and the failure of the government's response (Mason, 2011; Moore, 2010). Assessment of the media story angle suggests a disproportionate media stereotypical tendency to associate Blacks with delinquency and viciousness, a predisposition consistent with exaggerated and imprecise reports regarding criminal commotion in Katrina's aftermath (Balaji, 2011; Sommers, Apfelbaum, Dukes, Toosi, & Wang, 2006; Stabile, 2007).

2.5.7 Immigrants

In comparison with persons born in the United States, the foreign born are more likely to live in poverty, less likely to have a high school diploma, and less likely to have health care coverage (Truman et al., 2009). These risks of adverse consequences of disasters are most severe for undocumented persons, because they may avoid contact with public officials as they are afraid of detention and deportation (Truman et al., 2009). Immigrants are also predisposed to physical symptoms of distress, and non-western immigrants

are more likely to express feelings of distress in a somatic rather than in a psychological way (Berg et al., 2008). However, white and black racial culpability seldom makes any room for other ethnic minorities, who are not properly identified in any event (Reyes, 2010).

Several linguistically isolated and culturally diverse population groups, who speak Spanish, Chinese, Vietnamese, Somali, or other languages, are disproportionately disadvantaged in the United States in the absence of culturally and linguistically appropriate disaster preparedness plans (Nepal, Banerjee, Perry, & Scott, 2012; Nepal, Banerjee, Slentz, Perry, & Scott, 2010). Li and colleagues (2008) surveyed 113 Vietnamese-Americans, and found approximately 75% of Vietnamese Americans speaking Vietnamese very often or always on a daily basis. One of the evacuation problems during Katrina that affected Vietnamese Americans far more than African Americans was language (W. Li et al., 2008). Despite language difficulties, strong family, social, and economic ties among the Vietnamese Americans within and outside the affected areas had fostered resilience (Norris, VanLandingham, & Lung, 2009; Wei, Airriess, Chen, Leong, & Keith, 2010).

Reyes (2010) documented the intersections of local, state, and federal policy regarding schools and recovery relief showing that access to disaster relief and recovery were structured in the context of immigration status often placing citizen children in at-risk conditions. In the aftermath of Hurricane Katrina, some children in New Orleans and the Gulf Coast region from Latino communities had become the victims of anti-immigrant sentiment that shadowed lives of the undocumented population (Reyes, 2010). Disaster recovery was further constrained by broader structural issues, such as poverty, lack of transportation, as well as marginalized status as immigrants (Messias, Barrington, & Lacy, 2012; Stringfield, 2010).

In addition, Hurricane Katrina had significant negative impacts on the mental and physical health of many immigrants in New Orleans, and being middle-aged, being less acculturated, and having extensive post-Katrina property damage had statistically significant negative health impacts (Norris et al., 2009; Vu & VanLandingham, 2012). Many minority immigrant groups were residing in a specific, small, and spatially defined areas in New Orleans and experienced problems in evacuation and returning to the city (Wei et al., 2010). However, some immigrants and refugees might be more vulnerable than other groups because of

preexisting health and social inequalities, migration history, and their living conditions in the United States (Truman et al., 2009).

2.6 Social Environment

2.6.1 Health

The risk for outbreaks of contagious diseases is often presumed to be very high in the chaotic situation that follows natural disasters, which derived from population displacement, availability of safe water and sanitation facilities, degree of crowding, underlying health status of the population, and availability of healthcare services (T. O'Dempsey, 2009; J. T. Watson, Gayer, & Connolly, 2007; Wisitwong & McMillan, 2010). The poor are more likely to experience deteriorating health, due to the evacuation process and residential environment variables, changes in employment, alteration in income, fewer housing options, and ineffective relocation policies (Lu, 2011). Physical health is poorer among disadvantaged people, including those with low levels of education, those in poverty, the unemployed, and minorities (Lu, 2011).

Poverty is one of the primary and consistent predictors of social health disadvantage as measured by higher rates of infant mortality, low infant birth weight and premature mortality (Sherrieb, Norris, & Galea, 2010). The poor are more likely to experience deteriorating health due to the evacuation process and residential environment variables, changes in employment, alteration in income, fewer housing options, and ineffective relocation policies (Lu, 2011; Wisitwong & McMillan, 2010). The development of posttraumatic stress disorder (PTSD) after a disaster, generally is the most prevalent psychiatric disorder among people with low socio-economic status (Batniji, Van Ommeren, & Saraceno, 2006; Diene et al., 2012; Galea, Tracy, Norris, & Coffey, 2008; Grattan et al., 2011; Grimm, Hulse, Preiss, & Schmidt, 2012; Kessler et al., 2008; Kraemer, Wittmann, Jenewein, & Schnyder, 2009; North, Oliver, & Pandya, 2012; Pietrzak et al., 2012; Wisitwong & McMillan, 2010).

During Hurricane Katrina and its aftermath, many evacuees, with disproportionate numbers of low-income African Americans without health insurance coverage, encountered physical and emotional strain, including going with inadequate food and water (Brodie et al., 2006). City's two-thirds African American population faced extreme health discrepancies; they were considerably more likely to suffer from heart disease, diabetes, asthma, and other ailments (Catalani et al., 2012). Inadequate investment in health services

accessibility and other related community support mechanisms leaves poor populations who are already underserved at a difficulty during the emergency management procedure (Madianos & Evi, 2010; Rabito, Iqbal, Perry, Arroyave, & Rice, 2012; Redlener, 2008). The prevalence of mental illness more than doubled and suicides tripled from pre-Katrina levels among the black communities, renters, unemployed, and the poor (Catalani et al., 2012; Kessler et al., 2008; McLeish & Del Ben, 2008; Mezuk et al., 2009).

2.6.2 Education

Education and consciousness at all levels is important to changing people's perception and action towards natural disasters. In several studies, education was revealed as an important background variable to show consistent effects to cope with natural disasters (Arnold, 2006; Fillmore et al., 2011; Norris et al., 2005; Nozawa, Watanabe, Katada, Minami, & Yamamoto, 2008; Pagan, 2010; Webbink, 2008). Poverty can be remarkably affected by access to education and subsequently increase vulnerability (E. Ali & Talukder, 2010). People from disadvantaged groups, who are less educated, receive less supports during and aftermath of a disaster (Norris et al., 2005). Moreover, educational institutions have a quantifiable impact on the well-being of displaced students (Glaeser, 2011). When displaced children are privileged enough to be enrolled in a school that can reduce the extents of economic distress of students (Barrett et al., 2012).

Hurricane Katrina displaced the largest number of public school children ever affected by any disaster where approximately 370,000 children were scattered throughout the 48 U.S. states (Redlener, 2008; Reyes, 2010). It damaged the schools in New Orleans which resulted in thousands of students missing out on getting an education (K. R. Collins, Savage, & Wainwright, 2008; Tuzzolo & Hewitt, 2006). The displaced residents enrolled their children in schools in other states, however, it was still hard for children to acclimate after a crisis in addition to familiarizing themselves to a new school and making potential friends (Barrett et al., 2012; Fields, 2005; Johnson, 2008). When students had returned to the affected areas, it was a monumental task to meet the needs of the students (Henry, Cho, & Dupuis, 2008). Education officials were confronted with miscellaneous challenges in the post-Katrina environment, including retention, advising, admissions, financial aid, student records, and recruiting (J. Jones, Das, Huggins, & McNeely, 2008; D. E. Lee, Parker, Ward, Styron, & Shelley, 2008; L. M. Watson, Melancon, & Kinchen, 2008). There were reduced academic performances and abilities to concentrate among child survivors (Barrett et al., 2012).

2.6.3 Housing

Housing vulnerability is an obvious constituent of the disaster, as many dwellings are destroyed or rendered uninhabitable during disasters creating economic and material shock to the residents (Rathke, 2005; Tipple, 2005). The market values of real estates are influenced by environmental risks, because the emotional composition strongly affects the decision of property acquisition, such as risk of a natural disaster, especially if the area has already suffered from a disaster (Nikolaos, Dimitra, & Agapi, 2011). Moreover, in the aftermath of catastrophic natural disasters, emergency management agencies come under intense pressure to provide temporary housing to address the large-scale displacement of the vulnerable populations which enable displaced families to reestablish their normal daily activities until permanent housing solutions can be provided (El-Anwar, El-Rayes, & Elnashai, 2010).

Homeownership is an important material resource as it ensures security, independence, and privacy (Sherrieb et al., 2010). While people with homes are more exposed to risk, homeowners are more likely to have safety nets such as ample insurance coverage to mitigate losses (Zottarelli, 2008). People who do not own their homes tended to recover more slowly. Disparity in homeownership is a potential measure of inequality, and socially disadvantaged populations are less likely to own their homes, even when controlling for socioeconomic factors, family composition, and location (Sherrieb et al., 2010). Even with homeownership, when issues of race and class are overlaid, lower-income and minority homeowners are more likely to be under-covered or have periphery or secondary-market insurance (Zottarelli, 2008). For instance, in the wake of Hurricane Katrina a majority of low-income housing was destroyed; subsequently those who lacked money had returned to the city very slowly (Hazel, 2009). In the aftermath of Hurricane Katrina, homeownership placed a significant obstruction for residents to return to New Orleans because of the arduousness of finding rental housing in New Orleans, and poor homeowners themselves faced considerable problems in either revamping or selling their houses (Adams et al., 2009; Sastry, 2009).

In many disasters socially marginalized populations, who usually do not conform to credits standards for subsidized loans, are at a disadvantage in accessing government residential assistance (Hirayama, 2000; Kamel & Loukaitou-Sideris, 2004). The effects of Katrina were much worse for residents who were not homeowners because FEMA helped those who did own homes or other property, providing

rent subsidies to those who were able to find rental units in New Orleans (Adams et al., 2009; Rathke, 2005). Housing for very low-income renters was challenging for local governments and nonprofits to provide (Bell et al., 2010). Affordable housing remained a critical problem for hurricane survivors created by the devolution of housing production by the federal government, despite concerted efforts by local agencies throughout the Gulf Coast and in host communities (Bell et al., 2010).

2.7 Economic Determinants

2.7.1 Disaster and Economy

Floods, earthquakes, volcanoes, hurricanes, droughts, and similar disasters seriously interrupt economic activity by disrupting transportation, affecting manufacturing, reducing agricultural production, creating shortages in raw materials, prejudicing external investment, and channeling public and private sector resources into reconstruction (Asef, 2008; Bankoff, 1999; Chee-Kien & Pieris, 2011; Manuel-Navarrete et al., 2007; Posner, 2004). Billions of dollars are raised through taxes and private donations expended for postdisaster recoveries (Penning-Rowsell & Wilson, 2006; Pompei, 2008). Natural disasters affect the population through the destruction of natural and physical capital on which people rely for their livelihood and quality of life and impacts vary meaningfully across populations (Ibarrarán, Ruth, Ahmad, & London, 2009). Disasters are associated with property-related challenges and losses, because consumers can experience loss of possessions potentially (impending threat), temporarily (through evacuation), partially (some property damage), or completely (home and possessions devastated) (Delorme, Zinkhan, & Hagen, 2004). A major disaster could directly affect the local economy, but could also be echoed around a larger region (Asef, 2008; Bergholt & Lujala, 2012; E. Parker, 2011).

Disasters deter development by destroying years of efforts and labor and perpetuating poverty for those already poor as well as they destroy investments and infrastructure at the city and the national level (Sanderson, 2000; Syroka & Wilcox, 2006). The affected people who have better financial means can soon recover from the losses of natural disasters (Delorme et al., 2004; Kahn, 2005). On the other hand, poor people are unable to afford the costs of repair, reconstruction, or relocation in an efficient and timely manner

(Masozera et al., 2007). Moreover, government reimbursements are paid from the funds accumulated from direct taxes; thus, it happens that poor men subsidize rich men who are living in landscape-attractive regions that are however subject to serious risks (Ermolieva & Sergienko, 2008). After Hurricane Katrina, many displaced people suffered income declines, lost important resources, reduced quality of life, and inaccessibility to primary healthcare facilities (Hori & Schafer, 2010). However, the loans that have been approved appear to be flowing to wealthy neighborhoods in New Orleans but not to poor ones (Masozera et al., 2007). With increased frequency of natural disasters, social vulnerability can magnify over time forcing groups into a permanent state of poverty and exposure (Ibarrarán et al., 2009).

Infrastructure has a pivotal role to play in development; however, infrastructure assets are vulnerable to natural hazards and face challenges due to increased frequency and erraticism of climate-induced natural disasters (Naswa & Garg, 2011). The destruction of infrastructure, such as levees and dikes, communications systems, sewers, landfills, roads, automobiles, gasoline supply networks, petro-chemical plants, have direct and indirect costs to national economies (Hill, Wiener, & Warner, 2012; Inyang, 2009; Sims, 2007). While the destruction results in direct costs that are necessary to restore the physical destruction and repair of existing infrastructure, the indirect loss is significant when compared to the direct loss and hence should be considered by policy-makers when making both pre- and post-disaster infrastructure decisions (Tirasirichai & Enke, 2007). In addition, natural disasters are also devastating for tourism industry, mostly those located on high-risk exotic locations (Bill, 2001; Calgaro & Lloyd, 2008; Robinson & Jarvie, 2008; Scanlon et al., 2007; Trivedi, 2009).

Some recent studies found a significant positive correlation between the frequency of natural disasters and the long-run economic growth after conditioning for other determinants which can be interpreted as evidence that disasters provide opportunities to update the capital stock and adopt new technologies, thus acting as some type of Schumpeterian creative destruction (Agrawal, 2011; Cuaresma, Hlouskova, & Obersteiner, 2008; S. Davies, 2010). Disaster-time economies are not closed in most cases because of their deep connections with the regions and accepting donations from outside the region which made possible by technologies of the information age and the dynamism of border crossing comprising human interconnectedness and varied relationship networks (Nitagai, 2012; Skidmore & Toya, 2002).

Although significant drops in personal income were detected due to higher levels of commercial and industrial damage in the 1993 Midwest flood in the United States, the long-run effects seemed to be negligible as the per capita income rebounded to pre-flood conditions in the years after the flood (Xiao, 2011). The reconstruction effort after a tornado in May, 2007 in the town of Greensburg, Kansas, has attracted ecotourism providing more economic development (Kapnik, 2009).

Although several economists argued that disasters can have a positive impact on some emerging economies without accounting for unequal distributional or social and human consequences, this would not be the case of certain hazards which cause severe direct and indirect damages to household economies (Arnold, 2006). The reconstruction quality can either decrease or increase disaster cost but is never able to turn disasters into positive events (Hallegatte & Dumas, 2009). In the aftermath of a disaster severe economic contraction usually causes disproportionate levels of poverty, because the poorest are forced to sell their assets. An economic recovery may pull some of these people out of destitution, but characteristically many others remain poor even when the macro-economy rebounds (Cardona, Ordaz, Marulanda, Carreño, & Barbat, 2010; de Waal, 2004; Ibarrarán et al., 2009; Jacob et al., 2008; Kaur, 2006). In certain cases there is a negative relationship between income per capita and measures of risk from natural disasters which is supportive of logic that higher incomes allow to mitigate disaster risk (Kellenberg & Mobarak, 2008).

The poor farmers are more vulnerable and suffer the most not only because they see a decline in standard of living by any crop damage in disasters, but also they face a direct financial blow, resulting at times in difficulty procuring seed stocks for the following growing season (Banerjee, 2007; Brázdil, Valášek, & Chrom, 2006; Navrud, aaring, le, Tran Huu, & Bui Duc, 2012). The magnitude of disaster has the potential to affect employment, social, and economic factors among farmworkers (Mainville, 2003; Steege, Baron, Davis, Torres-Kilgore, & Sweeney, 2009). Reduction in revenues from the affected region due to low yield and damage to infrastructure increase the economic loses (Kaur, 2006).

Small businesses are more vulnerable to disaster impacts than their larger counterparts, even though they are a crucial contributor to local government revenue generation and community employment, especially in socio-economically distressed neighborhoods (Corey & Deitch, 2011; Krantz, 2010; Z. Yang, Lindell, & Prater, 2009). Even after Katrina, the Small Business Administration (SBA) did not adjust its

creditworthiness standards, despite the widespread poverty in the most damaged regions (Masozera et al., 2007). Businesses are more likely to relocate when the property was leased or rented relative to business property that was owned along with the degree of building damage disruptiveness (Wasileski et al., 2011). Infrastructure protection including the levee, utility, communications, and the issue of crime were the main concerns for the businesses that had opened (Beggan, 2010; Leitner, Barnett, Kent, & Barnett, 2011). Businesses in the professional, scientific and technical services were found to open more promptly in the aftermath of Katrina, while businesses in education, health care, social assistance, and public administration suffered most during the immediate aftermath (Lam, Pace, Campanella, LeSage, & Arenas, 2009).

2.7.2 Employment

In order to break the cycle of poverty, individuals must have access to jobs that pay a living wage. Employment is an significant factor of effective disaster recovery (Zottarelli, 2008), because rapid employment recovery led to more wages, more tax revenues, and more spending all of which added value to the state economy (Weaver & Vozikis, 2010). The economic problems that follow disasters often stance significant obstacles to providing opportunities for workers to regain their previous level of employment. Providing a job, and thereby restoring the family to the pre-disaster level of functioning is of primary importance in helping stabilize and mitigate other problems, because economic complications are the underlying factors contributing to social disturbances in the aftermath of disasters (Magaliff & Crimando, 2007).

Disasters have significant short-term and long-term impacts on employment and employment structures in affected regions (Lilly, Kavanaugh, Zelbst, & Duffy, 2008; Mehregan, Asgary, & Rezaei, 2012). Aftermath of Hurricane Katrina, living with long-term stress related to loss of jobs and continuous struggle for a decent life in unsettled circumstances manifested “chronic disaster syndrome” (Adams et al., 2009; Zack, 2009). Developing a federal government jobs program with competitive workers’ wage level in the U.S. Gulf Coast region could benefit Gulf Coast residents who frequently hit by hurricanes (Gabriel, 2008). However, there are several studies conducted related to impact of disasters on employment, but found no evidence of employment decreases, and even total employment increases after a disaster (Mehregan et al.,

2012; Olson, 2011; Xiao, 2011). Although there is a rapid increase in jobs in manufacturing and construction sector increases, in some cases the agricultural job and wage declines in the short-term is evident in some regions (Mueller & Quisumbing, 2011; Schwartz & Underwood, 2011).

Zissimopoulos and Karoly (2010) examined the short- and longer-term effects of Hurricane Katrina on the labor market outcomes of prime-age individuals in the most affected states, namely Alabama, Florida, Louisiana, and Mississippi. They found a significant role of self-employment as part of post-disaster labor market recovery, especially for evacuees who did not return, due to poor job prospects and new opportunities for starting businesses (Zissimopoulos & Karoly, 2010). The complexity of inequality, including race, displacement, gender, income, and homeownership played as important determinants of employment recovery. Individuals with a lower income at the time of Hurricane Katrina were less likely to experience employment recovery, elderly people were less likely to have employment recovery than younger people, and women were less likely to achieve employment recovery compared to men, homeowners were more likely to achieve employment recovery compared to non-homeowners (Zottarelli, 2008).

The resilience of labor markets is crucial for the poor who rely on labor to reduce risk when natural disasters devastate economies as they impede capital accumulation (Mueller & Quisumbing, 2011; Navrud et al., 2012). These employments have been scarce in New Orleans, where the economy is dominated by the service sector during Hurricane Katrina. Low-income blacks from New Orleans were more likely to lose their jobs in the wake of Hurricane Katrina (Elliott & Pais, 2006). Addressing the low-wages in many cities is required to reduce individual's vulnerability to future natural disasters (Masozera et al., 2007).

2.7.3 Inequality

Although cities frequently are viewed as spaces of opportunities, they also can be places of high inequality, in terms of income and livelihood facilities, education, and availability of proper housing and shelter, health services, potable water, sanitation, and physical protection (Lucchi, 2012). It suggests that after a disaster, areas with high income inequality may suffer more detrimental consequences of that disaster (Ahern & Galea, 2006). Socially disadvantaged groups are pressured to occupy hazardous environments while they experience decreased capabilities to cope with environmental change (T. W. Collins, 2009; Wamsler, 2006; Wiener, 2007). Arguably, more equitable social relations can support the development of

more democratic and participatory disaster-resilient communities (Allenby & Fink, 2005; Enarson, 1998; Mallick et al., 2011; Sherrieb et al., 2010; Tavoni, Dannenberg, Kallis, & Löschel, 2011). Inequities in the socio-demographic structure derived from race, class, gender, and age differences in income (Parekh, 2009) which shape the social vulnerability and responses to natural disasters (Finch et al., 2010).

Many people are becoming more vulnerable due to the existing trends of resource exhaustion, environmental degradation, population growth, and rapid urbanization, consequently the gap between the rich and the poor as well as the absolute number of poor people is increasing (Anderson, 1994b). The powerless poor may fall into the abyss of economic and environmental poverty, while the powerful wealthy may achieve rapid economic growth with little environmental sacrifice (L. Lee, 2011; Mogull, 2007). Quantitative evidence suggests that income per capita and inequality are foremost factors of natural disaster mortality in Latin America (O. Rubin & Rossing, 2012). In many cases natural disasters aggravate social inequalities, and the gaps between poor and rich people tend to widen in the aftermath of a disaster (Bankoff, 1999; Zamani et al., 2006). In some cases, discrimination and financial capitals strappingly affect the flow of disaster relief (Aldrich, 2010; Assanangkornchai et al., 2004; Wiener, 2007).

2.7.4 Insurance

Disaster insurance provides peace of mind and financial safety; however, increasing frequency of natural disasters can have adversative impacts on insurance affordability and accessibility, potentially decelerating the growth of the industry and shifting more of the encumbrance to governments and individuals (Barthel & Neumayer, 2012; Grove, 2012; E. Mills, 2005; Zolfaghari, 2010). Coping with natural disasters remains difficult for certain groups in society, for example, the poorest people usually face the most difficulties in finding informal insurance markets (Fitzpatrick, 2007; Hoop & Ruben, 2010). If low-income people could be insured against perils through contracts with informal institutions, the negative consequences of natural catastrophes would be largely reduced (Becchetti & Castriota, 2010; Hoop & Ruben, 2010; Winchester, 2000).

Though expensive, the United States government often provides grants or low-interest loans to citizens who are victimized by natural disasters (Barnett, 1999). Effective growth of private insurance can reduce government burdens in postdisaster situations (Faure, 2007); however, private insurance in the prevention

and mitigation of natural disasters could pose an equity-efficiency trade-off for the policy makers (Picard, 2008). Public–private partnerships involving insurance companies and governments often provide security against the human and economic losses of disasters (Linnerooth-Bayer & Mechler, 2007; Michaels & Malmquist, 1997; Newkirk, 2001). In the wake of a disaster, recovery can be faster by providing a means to extend insurance to all local residents, including socially disadvantaged groups (Burby, 2006).

2.8 Political Factors

2.8.1 Governance

As natural disasters are usually perceived by the general population as outside the government's control, usually the economic consequences of disaster are not blamed on the government (Bergholt & Lujala, 2012). However, Hurricanes Katrina and Rita raise grave questions concerning the capacities of local, state, and federal governments to deal with major catastrophic disasters (Ii, 2006; Waugh, 2006). The burden of government failures fell heaviest on the African-American, poor, aged, and infirm members of the population (Kates et al., 2006; Sylves, 2006). Most of the tens of thousands of people stranded by Katrina were members of the New Orleans's large socioeconomic underclass; consequently, the storm has exposed numerous numbers of poor people previously neglected by bureaucrats and political elites (Ii, 2006).

The city of New Orleans, the state of Louisiana, and the federal government were not prepared to respond to Hurricane Katrina and the flooding or to adequately address the immediate and longer term needs of the people from devastated areas (M. D. Brown & Schwarz, 2011; Bruna, 2007; Buckley, Sulmasy, Mackler, & Sachedina, 2012; Haider-Markel et al., 2007; Jeffrey & Menches, 2008; Osofsky, 2008; Pyles et al., 2008). The incompetence of government at all levels to meet the great challenges posed by such a widespread natural disaster, and that inept leadership, considerable communication breakdowns, and a lack of adequate planning at multiple levels of government compounded failures during Hurricane Katrina (Bhagat, Guha, & Chattopadhyay, 2006; Cunnigen, 2006; Gerber & Cohen, 2008; Lay, 2009; Wilson et al., 2008). Because of disaster response fiascoes during each phase of Hurricane Katrina, from preparedness to evacuation, the socially disadvantaged populations of New Orleans devastated in floodwaters (National Research Council, 2009; Zahran et al., 2008).

The poor are vulnerable to natural catastrophes not because of geography and natural disaster, but because of political sluggishness, discriminations, and deep-seated poverty, all of these were exacerbated by the dismantling of social welfare by governing administrations leaving socially disadvantaged groups stranded (Scheper-Hughes, 2005). Poverty in conjunction with administrative inefficiencies impede the implementation of planning, and vulnerable groups have only a small scope to reduce disaster damage even with greater warning (Pelling, Özerdem, & Barakat, 2002). Hurricane Katrina was one of the most devastating bureaucratic disasters, because the bureaucracy told people to evacuate and then turned their backs on those who did not have money for car fare or who did not have cars (Cole, 2005). The politics of megaprojects poses new questions about the governance of risk and the nature and limits of democratic politics (Keane, 2012), as government contracts in recovery phase often serve the interest of local elites (Hogan, Long, & Stretesky, 2010). The post-Katrina recovery process may contribute to the creation of larger, more segregated versions of affected regions that await exposure with the next major disaster (Pais & Elliott, 2008). Socially-powerful geographical groups of people have harnessed institutional means in their efforts to externalize risks and capitalize on environmental opportunities in some flood-prone areas (T. W. Collins, 2009).

The disaster declaration process is highly politicized and not necessarily based on need, and there is a spatial inequity between the receipt of disaster declarations and the distribution of major hazard events (Schmidtlein, Finch, & Cutter, 2008). Garrett and Sobel (2003) found that presidential and congressional influences affect the rate of disaster declaration and the allocation of FEMA disaster expenditures across states. According to the authors, States that are politically important to the president have a higher rate of disaster declaration by the president, and disaster expenditures are higher in States having congressional representation on FEMA oversight committees which also impacted by the election year. Almost half of all disaster relief is provided politically rather than by need (Garrett & Sobel, 2003). Reeves (2011) argued that presidents use unilateral power of presidential disaster declarations for particularistic aims to gain electoral support which allow presidents to unilaterally authorize potentially billions of dollars to specific constituencies. In an analysis extending from 1981 to 2004, the author found that a state's electoral competitiveness influences whether they receive a disaster declaration from the president, where a highly

competitive state can anticipate to receive twice as many presidential disaster declarations as an uncompetitive state (Reeves, 2011).

Governments often emphasize on quickly reducing risk, rebuilding communities and restore normality following disasters; however, this urgent pressure to address complex, difficult decisions could result in responsive policies that might heighten long-term vulnerability of affected populations (Chamlee-Wright, 2007; Ingram, Franco, Rio, & Khazai, 2006). Aftermath of Katrina, in Alabama and Mississippi, federal resources were placed under the sole authority of state governors, and did not met the requirements of socially disadvantaged and poor people (Lowe & Shaw, 2009). Local governments may have limited ability to withstand disaster shocks, because when public resources are devastated or diverter to relief efforts by disaster shocks, locally provided public goods, face different adversities (Barnett, Barrett, & Skees, 2008; Burby, 2006; Chauvin, Hilton, DiCarlo, Lopez, & Delcarpio, 2007; Newkirk, 2001).

Hurricane Katrina, one of the largest social catastrophes of the twenty-first-century American urban history, ignited pervasive popular and academic debates over domestic policies dealing with inquiries of race and class, individual and government obligations and accountability, and the relationship between society and the environment (Forgette et al., 2008; Gavin, 2008; Henkel et al., 2006; Trotter & Fernandez, 2009). Downsizing of New Orleans neighborhoods after Katrina disproportionately reduced black votes, black political power, and most importantly black wealth. The storm destroyed the black political structure in New Orleans, because in pre-Katrina the black population was 67 percent and in post Katrina black population was enumerated as 35 to 45 percent (Johnson, 2008).

2.8.2 Political economy

Natural disasters occur in a political space, and even disaster events beyond our control, the level of government preparedness and response significantly determines the extent of distress experienced by the affected populations (Adaman, 2012; Brody et al., 2008; Cohen & Werker, 2008; Wilson et al., 2008). Hurricane Katrina recovery process suggests that beyond need, politics can silhouette the governmental apportionment of disaster relief solutions (B. C. Davis & Bali, 2008). Natural disasters are not sole determinant of the course of socio-economic and political development, rather they delay or disrupt the implementation or changed the focus of planned or subsequent development initiatives (Barker, 2000). The

initiatives required to prevent, relieve or ameliorate the effects of natural disasters that serves mainly to disguise the root causes behind much of the vulnerability of particular societies to these phenomena and the manner in which certain sectors, known as "governing elites" in technocratic language, actually profit from them to enhance their political and economic interests (Bankoff, 1999).

Structural-political economy approaches to environmental hazards posit that people affected by disasters respond in different ways, depending on their position as well as on the social and political linkages involved, and because of their lack of economic and political power, disadvantaged groups receive less emergency assistance than victims of non-marginalized groups (Paul, 2006). Hurricane Katrina increased the insecurities already experiencing by the poor and exemplified the tangled relations between environment and politics, divulging desperate poverty (Bocking, 2005). The state of Mississippi had spent US$1 billion in federal funds on recovery programs, but they have mostly benefited relatively well-off residents and big businesses (Baade, Baumann, & Matheson, 2007; Trethewey, 2008). While private investment dollars and insurance settlements are likely to result in the reconstruction of the wealthier and economically vibrant areas of New Orleans such as the French Quarter, it is conclusive that public money would be indispensable to rebuild certain portions of the city, particularly those areas where private money is slow to return (Baade et al., 2007).

Many so called 'natural' disasters are the direct outcome of 'deviant' political and economic decisions and actions by governments (P. Green, 2005). Privatization, liberalization, and public sector retrenchment have pushed many people into impecunious conditions, while concurrently restricting the state's capacity to provide social safety nets, accordingly increasing vulnerability to disaster (Keys et al., 2006; Metoyer, 2001; T. J. D. O'Dempsey & Munslow, 2006; Schipper & Pelling, 2006). Major catastrophes have the potential to bring about tremendous social change, both the short-term social change emanating from disaster as well as more systematic social change produced by economic and political structures across long periods of time (Letukas & Barnshaw, 2008; Nel & Righarts, 2008).

The national investment in reducing future flood losses has been siphoned off in favor of local economic and political profits from exploiting the floodplain which is now playing out in New Orleans, with city and state leaders competing to rebuild the same levees and floodwalls that failed a few years back

(Colten, 2009; Pinter, Young, Bea, & Meade, 2006). Reconstruction efforts in New Orleans provided economic opportunities to companies with political connections (Powell, 2007).Those individuals impacted by Hurricane Katrina are even more directly harmed when relief resources provided to contractors fail to contribute to those who need them, when contractors for whom they work engage in discriminating labor practices or when large contractors failed to provide essential contribution for local people and businesses (Hogan et al., 2010). The deferred and ineffectual response to the storm and the subsequent failure of the levees become more comprehensible when one considers the concealed goals of social control in disaster recovery; for instance, constructing the survivors as suspect or criminal and conceptualizing the impacts of the disaster as individual complications occurred in order to justify the emphasis on controlling the survivors of Katrina rather than on supporting them (L. M. Miller, 2012).

Freudenburg and colleagues (2008) illustrated this issue with two contemporary and renowned cases of flooding in the upper Mississippi River Valley and in the Katrina-related destruction of New Orleans. They found that in the former case, damage was caused in part by building the very kinds of taller and stronger flood walls that were shown to be ineffectual, whereas in New Orleans, a more imperative factor in the death and devastation was the excavation of a transportation canal. In both cases, along with others, the fundamental causes of impairment to humans as well as to the environment has convoluted a three-part pattern, supported by the political system, spreading the costs, concentrating the economic benefits and concealing the real risks (Freudenburg, Gramling, Laska, & Erikson, 2008). Many experts inculcate levees as a major culprit in flood devastation, because levees narrow the flow of the water, preventing it from spreading out into the floodplain and forcing it to move faster (Black, 2008).

The particular niceties of the Katrina disaster, extending from the city's geography to the penetrating local and national political pressures involved, make it distinctive in many ways (Baade et al., 2007). Although the Mississippi River-Gulf Outlet, a transportation canal, was widely predicted to deliver prosperity, it mainly created environmental damages, destroying wetlands that had formerly protected New Orleans from hurricanes (Freudenburg, Gramling, Laska, & Erikson, 2009). Despite enthusiastic predictions about its economic importance in conjunction with millions of dollars in ongoing federal investments, the outlet was used by only a dozen of ships; therefore, it was undoubtedly not a case of an enduring trade-off

between the environment and the economy. It was a case where economic benefits to a small number of beneficiaries produced profound prices to the environment and to humans in turn (Freudenburg et al., 2009). Moreover, politically it's more acceptable if politicians to convince voters by providing demagoguery to construct structural barriers such as levees than declaring a relocation plan where people will be moved to higher ground and safe from floods forever (Black, 2008).

2.9 Discussions and Literature gaps

It is evident from the literature survey that the complexity of natural disasters encompasses social, economic, political, and environmental diversity. Every facet of the disaster process, from preparedness through recovery, is affected by demographic change, urbanization, coastal development, migrations, local culture, poverty, minority status, gender, family composition, age, and disability. Impacts of natural disasters are greater on socially disadvantaged groups. It is clearly evident from existing literature that certain subgroups of population, such as the poor, the elderly, women-headed households, and recent residents are at greater risk in all phases of disaster. Poverty occurs within a social and historical context in the United States, where the elderly, minorities, and women-headed households are more likely to be at the lower end of the socioeconomic spectrum (Cutter & Smith, 2009; Jacob et al., 2008; Loucks et al., 2006; Lu, 2011; Zottarelli, 2008). In many studies, socially disadvantaged population, including poor, women, elderly, children, disabled, and female-headed households have been identified as being more vulnerable than others because of their presumed socioeconomic constraints.

The recent disaster research, mostly after Hurricane Katrina, demonstrates that different political and economic factors unequally place people at risk in disaster situations. Disasters are closely intertwined with the larger patterns and practices of the society. The disaster research has also varied across the disciplinary boundaries. For example, political scientists concentrated mainly on the governance and political economy of disaster, sociologists focused on the social responses to disaster, geographers focused on spatial analysis and environmental hazards, social geographers considered human factors in disaster situations, psychologists concentrated on posttraumatic stress disorder and other psychological impacts of disaster on

human. Currently, Alice Fothergill and Greg Bankoff have made significant contributions in understanding social inequalities by gender, age, race, class, and ethnicity in hazardous environments.

There are relatively significant number of research have been conducted on political economy of natural hazards after Hurricane Katrina (Brown & Schwarz, 2011; Colten, 2009; Levitt & Whitaker, 2009; Gerber & Cohen, 2008; Wells, 2008). However, fewer have been published on Children (Bullock, Hadddow, & Coppola, 2011; Cherry, 2009; Zubenko & Capozzoli, 2002), elderly people (Allen & Nelson, 2009; Giroux, 2007; Klein, 2007), ethnicity (Bullard & Wright, 2009; Moore, 2010), poverty (Hollander, 2003), community resilience (Miller & Rivera, 2011; Coppola & Maloney, 2009), and social vulnerability (Cutter, 2001). Although gender has been neglected in the published research for long time, recently it emerges as a topic of interest (Enarson & Chakrabarti, 2009; Fothergill, 2004; Jones-Deweever & Hartmann, 2006). The examination of structured social inequalities is the major connection between poverty conditions and disaster vulnerability in the United States.

Historically, the disaster research in the United States strives more to technical disaster management than consider it as a social phenomenon. Researchers have only recently started to conduct studies on racial, ethnic, and class influence on disaster-related phenomena, mostly after Hurricane Katrina. As a result, most of the in-depth research has conducted on Hurricane Katrina. There are noticeable literature gaps exist on the impacts of natural disaster on overall disadvantaged population of the Gulf Coast States. Most of the studies utilized qualitative and case study methodologies on Hurricane Katrina in the context of New Orleans, Louisiana. Other thoroughly focused on specific disaster events and single communities rather than across events and communities. Moreover, a small number of comparative researches have been conducted. Studies on differential impacts of different types of natural disasters (e.g., hurricanes, tornadoes, floods etc.) are also inadequate in existing literature. The existing qualitative studies on small sample size were unable to provide a holistic picture of the disaster conditions in the Gulf Coast region. Therefore, an overarching comparative analysis among the counties of Alabama, Florida, Louisiana, Mississippi, and Texas is an existing gap in the literature. The long-term time series analysis over 30-year period is also missing in the existing literature. The current study is aimed to fill that literature gap for the Gulf Coast States.

CHAPTER 3

RESEARCH METHODS

3.1 Introduction

Disaster research has recognized certain groups are likely to be at greater socioeconomic risk, including the rural and urban poor, racial and ethnic minorities, women, children, the elderly, those with a previous history of responsive disability, and in general, those with a marginalized pre-disaster conditions (Doherty & Clayton, 2011). According to UNISDR (2009), disaster is defined as "a serious disruption of the functioning of a community or a society, involving widespread human, material, economic and/or environmental losses and impacts that exceed the ability of the affected community or society to cope using its own resources." Hurricane Katrina brought some of the issues of strategic silences to the forefront of the national discourse, such as extremes of poverty and wealth, histories of discrimination, and even governmental ineffectiveness and venality (Simmons, 2009). While many observers may have expected that the poorer are more likely to have been flooded in New Orleans, factually there is a complex relationship among income, race and Katrina-induced inundation exposure in the New Orleans area (Watkins & Hagelman, 2011).

3.2 Research Design

The research will employ "unobtrusive method" including secondary data analysis and content analysis. Different types of quantitative research techniques will be applied in this research, including frequency analysis, trend analysis, correlation analysis, and regression analysis. All counties of Texas, Louisiana, Mississippi, Alabama, and Florida will be brought into the statistical analysis. The study will consider different types of disaster, *viz.* hurricanes, flooding, droughts, earthquakes, avalanches, fogs, hails,

heat, landslides, lightning, severe storms, tornadoes, tsunamis, volcanoes, wild fires, wind hazards, and winter weather from 1980 to 2010. The comparison among the impacts of different types of disaster will be conducted. The unit of analysis would be the county. If the injuries or fatalities are 1 or above, or the property damage is more than US$1000.00, the data will be brought into analysis. The following table shows different analytical approaches that will be used in the study:

Table 4: Types of analysis will be used

Analytical approach	Nature of Analysis
Univariate analysis and Partial Analysis	Disaster Impact Frequency, trend analysis, and time series analysis of number of people affected, fatalities, injuries, loss of property and crops.
Quantitative relational analysis – correlation and regression analysis	Relationship between disaster impact and poverty (income, gender, ethnicity, age, employment, housing quality, immigration status, renters, occupation, education, special needs, social dependence, insurance coverage) at county level Relationship between poverty and disaster vulnerability at county level
Content Analysis	Survey different scholarly publications, policy documents, documents published by non-profits, international development organizations, United Nations, the World Bank, humanitarian agencies.

The study will also conduct content analysis in order to develop inferences from text. In addition, the content analysis will survey different scholarly publications, policy documents, documents published by non-profits, international development organizations, United Nations, the World Bank, humanitarian agencies, newspaper, and media, in order to find how they incorporated poverty reduction in disaster management policies. A systematic analysis of the content will help to identify certain linguistic style, certain focal keywords of dramatic elements, euphemisms, as well as the narrative style and communication type (e.g., story, commentary, in-depth technical report) (Allen & Nelson, 2009).

Table 5: Operationalization and Justification of variables

Variable Name	Operationalization and Justification
People below poverty line	This variable measures the people living below poverty threshold defined by the census. Poor people are more exposed to natural disasters and extreme weather events than the non-poor (Doherty & Clayton, 2011; Kim, 2012). In general, poor people live in the hazardous areas and they are more physically vulnerable. They are also economically vulnerable as disaster devastates their assets. There is a strong correlation between disaster impacts and poverty, because the poor are most affected in disaster situations.
People in Welfare	This variable measures the number of people who receives social security benefits. Along with the hardship of poverty, the welfare recipients are perceived by middle class as dishonest, uninterested in education, and dependent (Fothergill, 2003, 2004; Horton, 2012). The impacts of natural disaster exacerbate when governing administration dismantle welfare (Scheper-Hughes, 2005).
Single Mother Households	This variable calculates the number of female headed households in the county. Female-headed households are more likely to have inadequate preparation for a disaster and need more and dissimilar assistance after a disaster (Zottarelli, 2008). Single mother households are underprivileged and suffer most in the disaster (Takasaki, 2012).
Disabled People in Welfare	This variable estimates the number of disabled people who receives social security benefits. People with disabilities, including deaf, blind, mentally retarded, those and with restricted mobility are more vulnerable in a disaster (Clear, 2007; Guha-Sapir et al., 2007; Tatsuki, 2012).

Variable Name	Operationalization and Justification
Homeownerships	This variable measures the percentage of households occupied by owners. Homeownership is an important material resource as it ensures security, independence, and privacy (Sherrieb et al., 2010). While people with homes are more exposed to risk, homeowners are more likely to have safety nets such as ample insurance coverage to mitigate losses (Zottarelli, 2008).
Ethnicity	For simplification this variable measures the percentage of black population in the county. Racial and ethnic communities in the United States are more vulnerable to natural disasters, because of factors such as housing quality, location, building structure, level of insurance, community segregation, and cultural insensitivities (Bullard, 2008; Uttley, 2010). Moreover, race and class are inseparable as minority groups often have lower average incomes and poorer access to a variety of natural and social resources, such as education, legal representation, credit, insurance, and employment (Aldrich, 2012).
Unemployment	Unemployment is operationalized as unemployment rate that represents the number of unemployed people as a percentage of the civilian labor force. In order to break the cycle of poverty, individuals must have access to jobs that pay a living wage. Employment is an significant factor of effective disaster recovery (Zottarelli, 2008), because rapid employment recovery led to more wages, more tax revenues, and more spending all of which add value to the economy (Weaver & Vozikis, 2010).
Income	This variable is operationalized as per capita personal income which is the mean income computed for every man, woman, and child. It is computed by dividing the aggregate income by the total population. There are widespread academic claims that disaster impacts are unequally distributed in the affected communities according to their income composition (Forgette et al., 2008; Zahran et al., 2008).

Variable Name	Operationalization and Justification
Gender	This control variable has been operationalized as percentage of female population in the county. Significant number of studies focused on how men and women are affected and respond differently during disasters (Ginige, Amaratunga, & Haigh, 2009; Oxfam, 2010). Women are amongst the most vulnerable population groups because they are generally poorer than men, have less access to and control of resources, and many cultures might have restricted their means to become independent and take up positions of power (Cambron, Acitelli, & Pettit, 2009; Covan & Fugate-Whitlock, 2010).
Age	This control variable is operationalized as median age of the county. In general, there is consensus in the social science hazards literature that age and vulnerability to disasters are interconnected (Basher, 2008; World Health Organization, 2008). People of different age groups encounter different levels of vulnerability in disaster situation.
Educational Attainment	This variable has been operationalized as percentage of people of the age of 25 or more finished high school education. Education at all levels is important to changing people's perception and action towards natural disasters. In several studies, education was revealed as an important background variable to show consistent effects to cope with natural disasters (Fillmore et al., 2011; Pagan, 2010; Webbink, 2008). Poverty can be remarkably affected by access to education.
Net Domestic Migration	Net domestic migration is the difference between domestic in-migration to a county and domestic out-migration from it during the period. Domestic in-migration and out-migration consist of moves where both the origins and destinations are within the United States. The condition of the poorest worsen during the sequence of coping strategies, and their coping struggles result in enduring out-migration (Zamani et al., 2006).

Variable Name	Operationalization and Justification
Net International Migration	This variable computes any change of residence across the borders of United States. Natural catastrophes or persistent poverty might induce migration, both nationally and internationally (D. Yang, 2008). Natural disasters, such as floods, hurricanes, and heat waves usually lead to short-term domestic migration; however, slow-onset changes such as land degradation or rising sea levels in seaside areas may force people to migrate permanently (Barrett et al., 2012; Xin, Bengtsson, & Holme, 2012).
Population Growth	This variable refers to the percentage change in population over a year. If permanent migration is induced by disaster through the destruction of natural and physical capital on which people rely for their livelihood and quality of life (Ibarrarán, Ruth, Ahmad, & London, 2009), there is a possibility of change in population growth.
Foreign-born	This variable includes anyone who was not a U.S. citizen or U.S. National at birth. In comparison with persons born in the United States, the foreign born are more likely to live in poverty, less likely to have a high school diploma, and less likely to have health care coverage; however, the relative disadvantage varies by nativity and immigration status among foreign-born cohorts (Truman et al., 2009).
Local Government expenditure	This is the amounts of money paid out by local government in net of recoveries and other correcting transactions. Natural disasters seriously interrupt the economic activities by disrupting transportation, affecting manufacturing, reducing agricultural production, creating shortages in raw materials, prejudicing external investment, and channeling public and private sector resources into reconstruction (Chee-Kien & Pieris, 2011; Manuel-Navarrete et al., 2007). Billions of dollars are raised through taxes and private donations expended for postdisaster recoveries (Penning-Rowsell & Wilson, 2006; Pompei, 2008).

Variable Name	Operationalization and Justification
Local government revenue	This variable is the money received by local government from external sources -net of refunds and other correcting transactions. A major disaster could directly affect the local economy. (Asef, 2008; Bergholt & Lujala, 2012; E. Parker, 2011).
Federal Government expenditure	This is the amounts of money paid out by federal government. The destruction of infrastructure, such as levees and dikes, communications systems, sewers, landfills, roads, automobiles, gasoline supply networks, petro-chemical plants, have direct and indirect costs to national economies (Hill, Wiener, & Warner, 2012; Inyang, 2009).
Gross IRS income	This variable estimates the total money received by Internal Revenue Services (IRS). The tax revenue is connected to the employment recovery aftermath of a disaster (Weaver & Vozikis, 2010).
Earning in All Industries	This variable is the estimation of the earnings of all industries by place of work each year for all counties based on administrative records. Some recent studies found a significant positive correlation between the frequency of natural disasters and the long-run economic growth after conditioning for other determinants which can be interpreted as evidence that disasters provide opportunities to update the capital stock and adopt new technologies, thus acting as some type of Schumpeterian creative destruction (Agrawal, 2011; Cuaresma et al., 2008; S. Davies, 2010).

Operationalization of Poverty:

According to the United Nations "Poverty is a human condition characterized by the sustained or chronic deprivation of the resources, capabilities, choices, security and power necessary for the enjoyment of an adequate standard of living and other civil, cultural, economic, political and social rights." The poverty is operationalized by the measure of people living below poverty line, people in welfare, disabled people in

welfare, single mother households, and homeownerships rate at county level. Each of these variables has significant relationship with poverty conditions. Poverty is also closely related unemployment and income. The justification for using these proxy variables have been described in the above table.

Operationalization of State:

Five states of gulf coast region has coded as dummy variables so that each regression analysis provides five different equations for five states of the Gulf Coast region. When Texas excluded from the regression table the equation for five states can be formed as

Constant	Constant	AL	FL	LA	MS	TX
Alabama	1	1	0	0	0	0
Florida	1	0	1	0	0	0
Louisiana	1	0	0	1	0	0
Mississippi	1	0	0	0	1	0
Texas	1	0	0	0	0	0

For example, predicting poverty from fatalities controlling for ethnicity, unemployment, income, and age one dummy variable excluded from the model (arbitrarily say Texas). Then the prediction model for five states would be

For Alabama:

$$\text{Poverty} = \text{Constant} + \beta 1 * \text{AL} + \beta 5 * \text{Ethnicity} + \beta 6 * \text{Unemployment} + \beta 7 * \text{Income} + \beta 8 * \text{Age}$$

For Florida:

$$\text{Poverty} = \text{Constant} + \beta 2 * \text{FL} + \beta 5 * \text{Ethnicity} + \beta 6 * \text{Unemployment} + \beta 7 * \text{Income} + \beta 8 * \text{Age}$$

For Louisiana:

$$\text{Poverty} = \text{Constant} + \beta 3 * \text{LA} + \beta 5 * \text{Ethnicity} + \beta 6 * \text{Unemployment} + \beta 7 * \text{Income} + \beta 8 * \text{Age}$$

For Mississippi:

$$Poverty = Constant + \beta4*MS + \beta5*Ethnicity + \beta6*Unemployment + \beta7*Income + \beta8*Age$$

For Texas:

$$Poverty = Constant + \beta5*Ethnicity + \beta6*Unemployment + \beta7*Income + \beta8*Age$$

3.3 Research Questions

Donner and Rodriguez (2008) showed that disaster process is influenced by poverty in all stages, namely, disaster preparedness, impacts and recovery. Poor people usually live in low-cost affordable housing which is more vulnerable to disaster. Poverty is also highly influenced by race, gender, age factors, and geographic locations. Poor population, whether in New Orleans or in other cities, have a very little choice about where they might live (Donner & Rodríguez, 2008). They are often unable to move from the geographic location where they are concentrated due to extreme poverty and the little societal values. The impacts of disaster are highest for those individuals and families. In addition, they are often fall in least prioritized area during the disaster recovery process, consequently remain in an aggravated poverty situation (Rautela, 2006). Poverty conditions increase and living standards declines by the injuries, deaths and physical damage to infrastructure, agricultural crops, machinery and stocks as well as disruptions in other livelihood activities. The research questions of the study are as follows:

1) Do natural disasters exacerbate poverty?
2) Does poverty result in higher losses in a disaster?

3.4 Hypothesis

The research will conduct a secondary data analysis and content analysis to develop regression models linking the poverty, vulnerability and impacts of disasters. The basic hypotheses the research will test are as follows:

H1: Natural disasters are likely to increase poverty conditions.

H2: If there is a natural disaster, it is more likely to increase government expenditure.

H3: If the poverty level is higher in a county, the impacts from disaster will be higher.

H4: The higher the poverty conditions in counties, the higher social vulnerability from disasters.

It is observed that lower income people have less access to the information and early warning systems. They are unable to purchase insurance for natural disaster and hence more vulnerable towards disaster risks. However, poverty is not solely determined by economic level. Different studies have shown that poverty has a close relationship with ethnic minority, physical and mental disability, demographic criteria, and gender dimensions. The physical and psychological impacts are also high on the poor people. Many poor people do not possess car and rapid evacuation is not always possible for them. For this reason, the death toll is higher for poor people in many areas. They are more vulnerable towards health problem after disaster.

Moreover, the physical and socioeconomic impacts of disaster on different racial and ethnic groups are not similar. Different ethnic minority groups are more vulnerable to disaster due to poor housing construction, geographic locations, communal isolation and cultural insensitivity (Fothergill et al., 1999). Poor people also suffer in post-disaster situation. It is less likely for them to reconstruct houses. They have to wait for assistance which is not always possible to access. In developing countries, poor people forced to migrate to urban areas after losing their housing during disasters.

The main focus of this study is to identify the linkage of disaster impacts with poverty. Poverty is associated with low income, unemployment, few material possession, limited education, health problems, and insecurity of tenure, undernourishment, poor access to social and health services as well as poor access to insurance, loans and credits (El-Masri & Tipple, 2002). In addition, differential treatment towards the poor would be measured by the speed of response, adequacy of response, and support in returning homes.

Table 5: Variables and measure

Variable	Measures
Disaster	Fatalities; Injuries; Property loss in US$; Crop loss in US$
Economic status	Local and Federal government total expenditure; Government expenditure in health; Government expenditure in insurance; Government revenue; Gross income of IRS; Earning in all industries; Population growth
Poverty Conditions	Income; Gender; Ethnicity; Age; Employment; Housing quality; Immigration status; Renters; Education; Special needs; Social dependence; Insurance
Vulnerability	People living below poverty threshold Social Vulnerability Index (SoVI)

Table 6: Sources of secondary data

Secondary Data	Sources
Socio-economic characteristics	US Bureau of the census
County data with respect to natural hazards	Reports published at county level
Economic Losses	Hazard and Vulnerability Research Institute (HVRI)
Direct losses caused by weather events	National Climatic Data Center (NCDC) as the monthly *Storm Data* online database
Insured flood losses and paid claims	National Flood Insurance Program (NFIP; FEMA)
Emergency events database	EM-DAT
National Hazards Assessment Network	NATHAN (also SHELDUS, and the Storm Events database; they include county level data of the United States)

The poverty at county level will be measured by the variables described in **Error! Reference source not found.** . These variables are well-established by Hazards and Vulnerability Institute (HVRI) of University of South Carolina for measuring vulnerability of different places. In analysis Poverty rate by race, age, gender and occupation will be considered.

3. 5 Data Analysis Process

H1: Natural disasters are likely to increase poverty conditions.

Poverty conditions increase and living standards decline by the injuries, deaths, physical damage to infrastructure, agricultural crops losses, machinery and stocks, as well as disruptions in other livelihood

activities. In order to test this hypothesis a regression analysis of disaster impacts on income, poverty rate, and employment will be conducted. The assumption is that the income and employment are decreased due to the impact of natural disaster. The disaster impacts will be measured by the variables of number of people affected, fatalities, injuries, as well as private and public property losses.

H2: If there is a natural disaster, it is more likely to reduce government expenditure.

The assumption behind this hypothesis is that disaster impacts will reduce government expenditure in health, education, and infrastructure. In addition, the government revenue, private investment, employment, and population will decrease aftermath of disaster. In order to test this hypothesis regression models will be developed for prediction of local and federal government general expenditure, government expenditure in health, government expenditure for insurance and disabilities, government revenue, median household income, gross IRS income, and earnings in all industries from the disaster fatalities, injuries, and property and crop damages.

H3: If the poverty level is higher in a county, the impacts from disaster will be higher.

The assumption is that if the poverty conditions are higher in a region, the disaster impacts will be more devastating in that region. The poverty conditions will be measured by the variables of income, gender, ethnicity, age, employment, family structure, housing quality, immigration status, renters, occupation, education, special needs, social dependence, insurance coverage, and people living below the poverty threshold. The disaster impacts will be measured by the variables of number of people affected, fatalities, injuries, property losses, and crop damages.

Poverty conditions will be tested on four sets of variables, namely, poverty variables, demographic variables, housing variables, and social variables. People of all ages in poverty, people under age 18 in poverty, median household income, and unemployment rate will be included in poverty variables. Female population, ethnic minority populations, immigrants and migrants, rural and urban population, children and elderly population will be considered as demographic variables. Homeownership, total housing units, mobile homes, housing value, and median gross rent will be the measures of housing variables. Public school

enrollment, educational attainment, social security recipients, and people enrolled in hospital insurance and Medicare will be considered for social variables.

H4: The higher the poverty conditions in counties, the higher social vulnerability from disasters.

The social vulnerability index (SoVI) has been developed to measure the vulnerability of cities and counties. The assumption behind this hypothesis is that if the counties have higher poverty level, the people will be more vulnerable toward disaster. The poverty conditions will be measured by the variables of income, gender, ethnicity, age, employment, family structure, housing quality, immigration status, renters, occupation, education, special needs, social dependence, insurance coverage, and people living below the poverty threshold. The vulnerability of the region will be measured by social vulnerability index.

Coding will be processed after collection of data. A codebook will be constructed to identify meaning of the codes used to represent different attributes of variables. After preparation of codebook, the data will be transformed into machine readable forms so that computer program SPSS can read and operate the data (Jones-Deweever & Hartmann, 2006). The analysis will try to link the theory and the practical findings. It will try to discover patterns by analyzing frequencies, magnitudes, structures or types, processes, causes, consequences. The study will conduct variable oriented analysis. The aim is to achieve a partial, overall explanation using relatively few number of variables when a strong multicollinearity exists. Data analysis will be conducted in such a manner that new and unexpected relationships can be determined and the possibility of identifying unforeseen variables is not excluded (Giroux, 2007).

3.6 Rationale for Research Methods

The reason for choosing secondary data analysis is that the data has already collected in previous investigations and available for use by the social researchers. Moreover, available data sets from census and disaster database often include many more measures and cases and reflect more rigorous research procedures.

On the other hand, collecting primary data require more time and resources from a new investigation. Moreover, much of the ground work involved in creating and testing measures with the data set has already done for secondary data. The most importantly, most funded social science research projects collect data that can be used to investigate new research questions that the primary researcher who collected the data did not consider (Trivedi, 2009).

3.7 Limitations

There are several limitations to this study. The unavailability of sex- and age-disaggregated data as well as the demographic details of people who died, or were injured in disaster, made it difficult to measure directly how a disaster impacts socially disadvantaged groups. In addition, poverty reduction does not automatically lead people to improve their awareness about self-protection; for instance, affluence could lead people to build inappropriate structures that might be worse in disasters, such as earthquakes and hurricanes. Certainly, there is a relationship between poverty and natural disaster, because poor people cannot afford to build a house that could withstand earthquakes and cyclones (Ammann, Dannenmann, & Vulliet, 2006).

This study did not address social capital. Social capital represents resources of social contacts and the structure of contacts in a network, is also an important component of disaster mitigation. Three dimensions of social capital are often cited in disaster literature: structural, relational, and cognitive (Doerfel, Chih-Hui, & Chewning, 2010). According to Doerfel et al. (2010), structural social capital focuses on the network ties between organizations, relational social capital refers to the nature and degree of connection, and cognitive social capital involves the degree of understanding between partners about their capacity.

CHAPTER 4

RESULTS

4.1 Introduction

Alabama, Florida, Louisiana, Mississippi, and Texas have been devastated by a number of severe natural disasters, including Hurricanes Katrina and Rita. The trend of fatalities, injuries, property damages, and crop damages reveals an increasing impact of natural disasters in the first decade of twenty-first century due to the effects of Hurricanes Ivan, Katrina, Rita, and Ike. Alabama experienced major disasters fatalities and economic losses from Super Tuesday tornado outbreak (2008) and Hurricane Katrina (2005). This state has been struck by recent hurricanes, including Isaac in 2012, Gustav in 2008, Katrina and Dennis in 2005, and Ivan in 2004. However, tornadoes in April 2011 had exceeded the hurricanes for destructive power, impacting the state with winds (over 210 mph) that results in approximately 250 fatalities and $1.5 billion in property damages.

Florida experienced major disaster fatalities and economic losses from Hurricane Katrina (2005), Hurricane Frances (2004), Hurricane Charley (2004), Hurricane Ivan (2004), and Hurricane Andrew (1992). Hurricane Andrew, a Category 5 storm struck Florida with gusts of more than 200 mph, was the most expensive natural disaster in the US history until Hurricane Katrina. Major disaster fatalities and economic losses were experienced by Louisiana from Hurricane Katrina (2005), Hurricane Rita (2005), Tropical Storm Allison (2001), Flood (1995), and Hurricane Andrew (1992). Mississippi experienced most horrendous disasters losses from Hurricane Katrina (2005). Severe weather such as floods, tornadoes, hurricanes, drought, thunderstorms, winter storms, and wildfire are most common natural disaster in Texas, where at least one major disaster is declared nearly every calendar year. Major disaster fatalities and economic losses experienced by Texas from Hurricane Ivan (2004), Tropical Storm Allison (2001), and tornado outbreaks (1999).

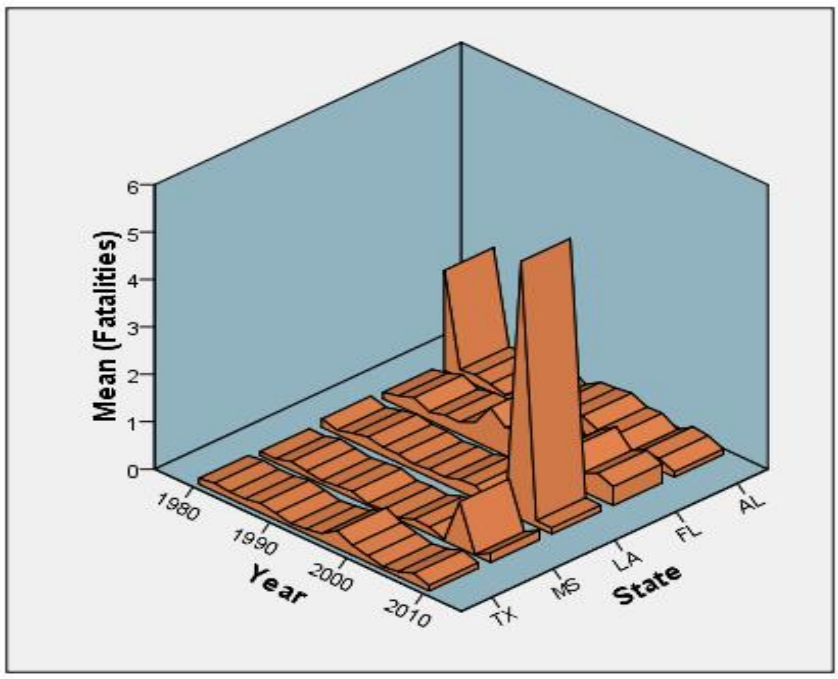

Figure 3: Fatalities in Gulf Coast States (1980-2010)

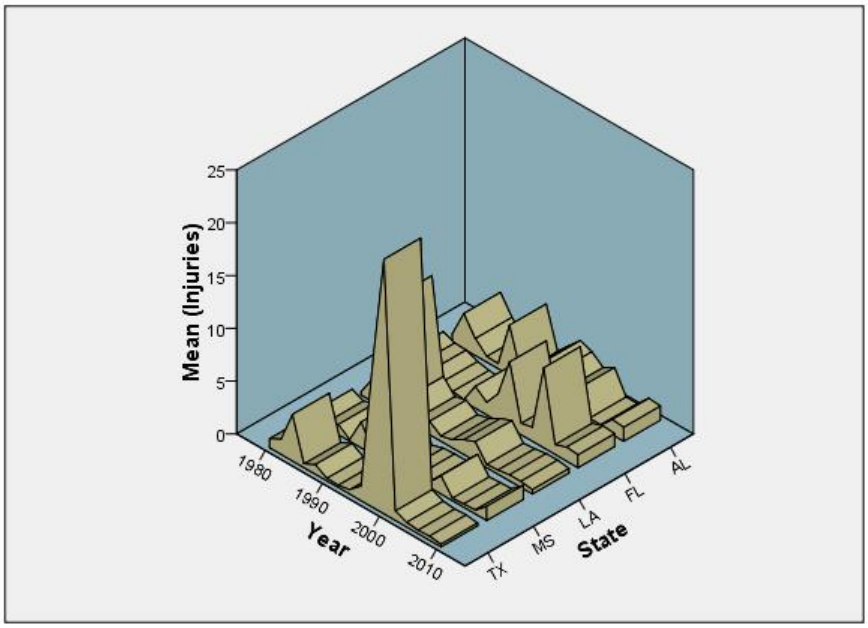

Figure 4: Injuries in Gulf Coast States (1980-2010)

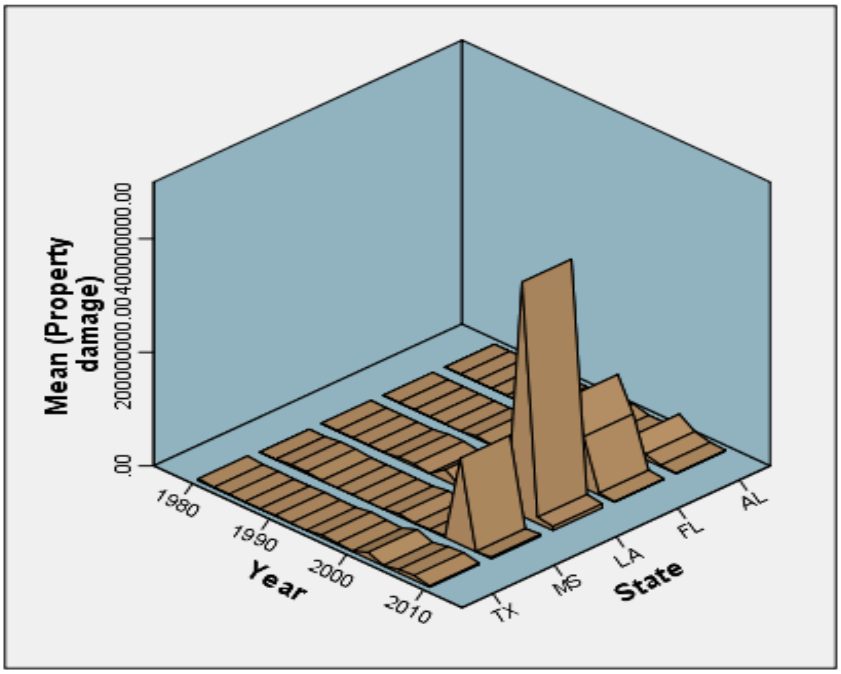

Figure 5: Property damage in Gulf Coast States (1980-2010)

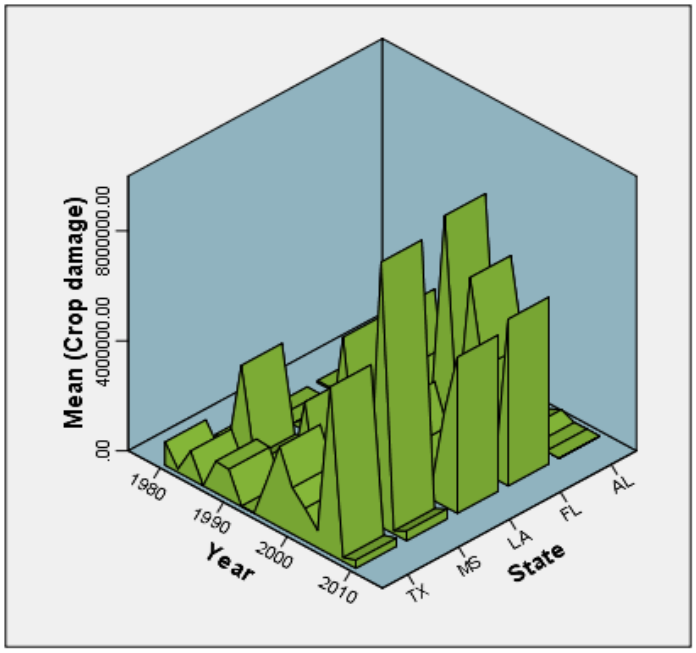

Figure 6: Crop damages in Gulf Coast States (1980-2010)

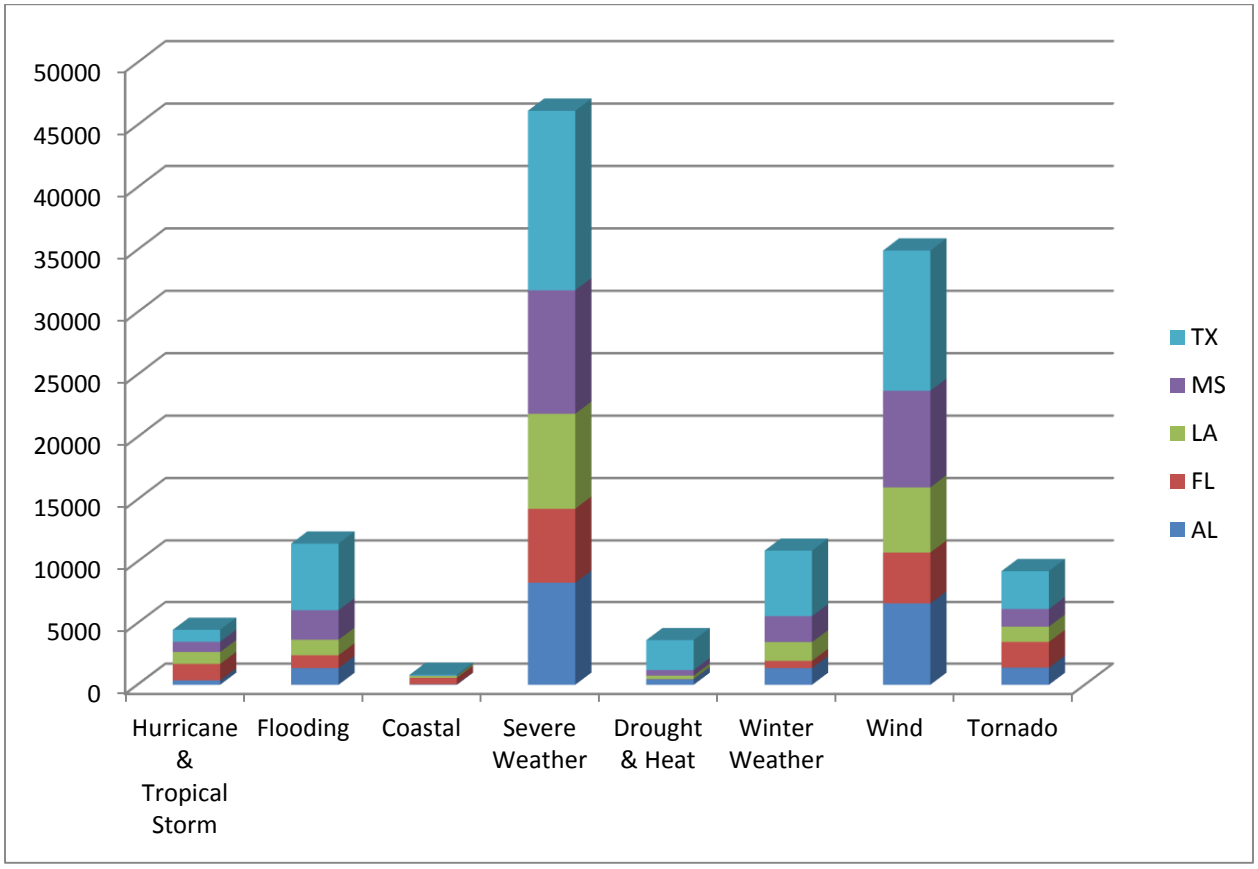

Figure 7: Distribution of Hazards Events (number of events)

In the Gulf Coast region data from 1960 to 2010 reveals that the numbers of severe weather and wind hazards have constructed highest number of disaster. The Gulf Coast states reported 121,872 natural disasters affecting almost all parts of the region. Severe weather accounted for 38 percent of these events, followed by wind hazards (29 percent), flooding (9 percent), winter weather (9 percent), tornadoes (7 percent), hurricanes and tropical storms (4 percent), droughts and heat (3 percent), and coastal hazards (1 percent). In addition, 272 incidents of wildfires and 2 incidents of landslide and avalanches have also reported in the Gulf Coast states. Texas has experienced a total of 43,047 disaster events which is highest among the Gulf Coast states, followed by Mississippi, Alabama, Louisiana, and Florida. Florida has faced highest number of hurricanes and tropical storms followed by Texas and Louisiana. Texas has encountered highest number of flooding followed by Mississippi and Alabama. Texas has also faced highest number of tornadoes, severe weather events, droughts, winter weather events, wind hazards, and wildfires.

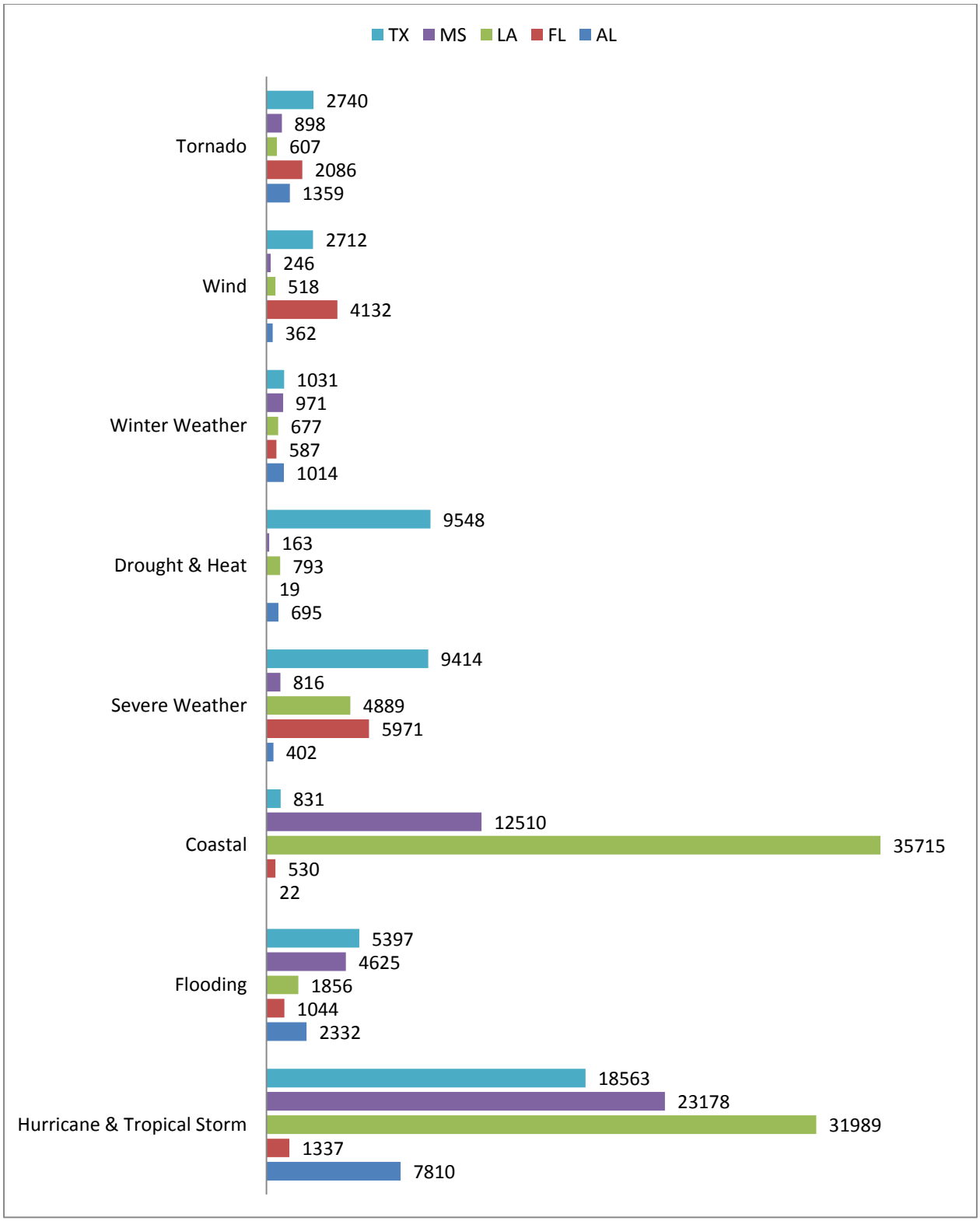

Figure 8: Distribution of Losses by Hazard Type (in million USD)

Although the numbers of coastal disasters and hurricanes are lower in the Gulf Coast states, they have caused massive economic losses in the region. Hurricanes are accounted for 41 percent (US$ 82,877 million) of the economic losses from natural disasters in the Gulf Coast region, followed by coastal hazards (25 percent), severe weather (11 percent), flooding (8 percent), droughts (5 percent), tornadoes (4 percent), wind hazards (4 percent), and winter weather (2 percent). Louisiana suffered highest amount of economic losses from hurricanes and coastal hazards, followed by Mississippi, Texas, and Alabama. The highest economic losses from flooding have occurred in Texas, followed by Mississippi, Alabama, and Louisiana. The losses from tornados are most prevalent in Texas, followed by Florida and Alabama. Wind hazard cost most damages in Alabama and Texas. Texas has also faced highest losses from droughts, severe weather, and flooding. The larger area of Texas might lead to highest absolute losses from disaster in some types of disaster. Regardless the type of disasters, their impacts result in loss of lives, injuries, damage to property, destruction of possessions, loss of services, social and economic turmoil and environmental degradation.

4.2 Correlations

4.2.1. Correlation Results for Alabama

Correlation analysis for the counties of Alabama from 1980 to 2010 shows that the number of fatalities has significant positive correlations with social security recipients, social security recipients with disability, Asian population, net domestic migration, net international migration, number of mobile home or trailer, disabled person enrolled in Medicare, aged person enrolled in Medicare, total person enrolled in Medicare, federal government insurance, federal government expenditure for individuals, retirement, and disability, federal government expenditure, earnings in all industries, civilian labor force, employment in accommodation and food services, employment in arts, entertainment and recreation, employment in healthcare and social assistance, employment in educational services, employment in administration, waste management and remediation services, employment in real state, employment in transportation and warehousing, employment in retail trade, employment in wholesale trade, employment in manufacturing, employment in construction, total private nonfarm employment, total housing units, and people of all ages

in poverty. The number of fatalities has negative correlations with housing value, homeownerships, educational attainment, and unemployment rate.

The number of injuries is positively correlated with social security recipients, disabled social security recipients, Asian population, female employment, IRS income, mobile home or trailer, disabled person enrolled in Medicare, aged person enrolled in Medicare, federal government expenditure for individuals, retirement, and disabled, federal government total expenditure, unemployment, employment in accommodation and food services, employment in health care and social services, employment in professional, scientific, and technical services, , employment in retail trade, employment in wholesale trade, employment in manufacturing, employment in construction, private nonfarm employment, total housing unit, people of all ages in poverty. The number of injuries is negatively correlated with homeownerships and elderly population.

Property loss is positively correlated with social security recipients, disabled social security recipients, American Indian population, per capita personal income, local government expenditure in health, local government direct expenditures, local government revenue, female employment, mobile home or trailer, median gross rent, housing value, disabled person enrolled in Medicare, aged person enrolled in Medicare, total person enrolled in Medicare, federal government insurance, federal government direct payments for individual, retirement, and disability, federal government total expenditure, educational attainment, earnings in all industries, unemployment, employment in accommodation and food services, employment in health care and social assistance, employment in educational services, employment in admin, support, waste management and remediation services, employment in professional, scientific, and technical services, employment in real estate, employment in transportation and warehousing, employment in retail trade, employment in wholesale trade, employment in manufacturing, employment in construction, employment in mining, employment in forestry, fishing, hinting and agricultural support, private nonfarm employment, total housing units, people of all ages in poverty. Crop damage is positively correlated with total housing units. Crop damage is negatively correlated with median household income, median gross rent, educational attainment, and homeownerships.

4.2.2 Correlation results in Florida

Correlation analysis for the counties of Florida from 1980 to 2010 shows that the number of fatalities, injuries, property damage and crop damage, all are positively correlated with population below poverty level, female employment, federal government insurance, federal government expenditures for individuals, retirement, and disabilities, total federal government expenditure, disabled person enrolled in Medicare, total person enrolled in Medicare, Female headed households, total housing units, urban population, social security recipients, disabled persons social security recipients, local government expenditures, local government revenue, female population, people of all ages in poverty, per capital personal income, earnings in all industries, unemployment, employment in accommodation and food services, employment in health care and social assistance, employment in educational services, employment in professional, scientific, and technical services, finance and insurance establishments, employment in retail trade, employment in wholesale trade, employment in manufacturing, employment in construction, private nonfarm employment, civilian labor force, resident population, and households with income 100,000 or more. The number of fatalities, injuries, property damage and crop damage are negatively correlated with homeownerships.

The number of fatalities is positively correlated with farmworkers, housing value, median gross rent, mobile home or trailer, net international migration, IRS income, local government expenditure in health, Latino population, Asian population, educational attainment, employment in arts entertainment and recreation, employment in administration, support, waste management and remediation services, employment in management of companies and enterprises, employment in real estate, employment in utilities, employment in mining, and median household income. The number of fatalities is negatively correlated with people under age 18 in poverty. The number of injuries is positively correlated with farmworkers, mobile home or trailer, net domestic migration, local government expenditure in health, educational attainment, and elderly population. The number of injuries is negatively correlated with children of age 5-17 in poverty, people under age 18 in poverty, and unemployment rate.

Property damage is positively correlated with farmworkers, net international migration, foreign born population, IRS income, Latino population, Asian population, employment in arts entertainment and recreation, employment in administration, support, waste management and remediation services, employment in management of companies and enterprises, employment in real estate, employment in utilities, employment in mining, and median household income. Property damage of fatalities is negatively correlated with children of age 5-17 in poverty, people under age 18 in poverty, and unemployment rate.

Crop damage is positively correlated with net international migration, foreign born population, IRS income, Latino population, employment in arts entertainment and recreation, employment in administration, support, waste management and remediation services, employment in management of companies and enterprises, employment in real estate, employment in utilities, and employment in mining.

4.2.3 Correlation results in Louisiana

Correlation analysis for the parishes of Louisiana from 1980 to 2010 shows that The number of fatalities is positively correlated with federal government insurance, population below poverty level, female employment, federal government expenditure for disability, federal government total expenditure, disabled person enrolled in Medicare, aged person enrolled in Medicare, female headed households, total housing units, mobile home or trailer, net international migration, urban population, social security recipients disabled person, , people of all ages in poverty, Asian population, Black population, earning in all industries, employment in accommodation and food services, employment in arts, entertainment and recreation, employment in educational services, , employment in administration, employment in management of companies, employment in professional, scientific and technical services, finance and insurance establishments employment in transportation and warehousing, employment in retail trade, employment in wholesale trade, employment in manufacturing, private nonfarm employment, civilian labor force, and, resident population. The number of fatalities is negatively correlated with homeownerships and unemployment rate.

The number of injuries is positively correlated with mobile home or trailer, net international migration, social security recipients, disabled social security recipients, IRS income, people of all ages in poverty, Asian population, public school enrollment, earnings in all industries, unemployment, employment in accommodation and food services, employment in arts, entertainment and recreation services, employment in educational services, employment in administration, employment in management of companies, employment in real estate, employment in information, employment in transportation, employment in manufacturing, employment in mining, private nonfarm employment, civilian labor force, and resident population. The number of injuries is negatively correlated with children of age 5-17 in poverty, people under age 18 in poverty, and per capita personal income.

Property damage is positively correlated with federal government insurance, farmworkers, federal government expenditures for disability, federal government total expenditure, disabled person enrolled in Medicare, aged person enrolled in Medicare, total person enrolled in Medicare, net international migration, rural population, disables social security recipients, social security recipients, direct general expenditures, general revenue, people of all ages in poverty, Latino population, Asian population, earnings in all industries, employment in accommodation and food services, employment in arts, entertainment, and recreation, employment in educational services, employment in administration, employment in management of companies, employment in professional, scientific and technical services, employment in real estate, employment in finance and insurance, employment in information, employment in transportation and warehousing, employment in retail trade, employment in wholesale trade, employment in manufacturing, private nonfarm employment, and median household income. Property damage is negatively correlated with homeownerships, elderly population, and resident population.

Crop damage is positively correlated with total crop land, farmworkers, mobile home or trailer, rural population, local government expenditures, per capita personal income, public school enrollment, unemployment rate, employment in manufacturing, and employment in mining. Crop damage is negatively correlated with children of age 5-17 in poverty, and number of households with income of $100,000 or more.

4.2.4 Correlation results in Mississippi

Correlation analysis for the counties of Mississippi from 1980 to 2010 shows that The number of fatalities is positively correlated with population below poverty leve, female employment, federal government insurance, fedreal government expenditure for disability, federal government total expenditure, disabled person enrolled in Medicare, aged person enrolled in Medicare, total person enrolled in Medicare, Female headed households, total housing units, housing value, mobile home or trailer, urban population, rural population, social security recipients, disbled social security recipients, IRS income, people of all ages in poverty, per capita personal income, resident population, Asian population, educational attainment, public school enrollment, earnings in all industries, unemployment, employment in accomodation and food services, employment in arts, entertainment and recrerational services, employment in adminsitration and waste managemetn, employment in management of companies, employment in real estate, finance and insurance establishments, employment in retail trade, employment in wholesale trade, employment in construction, private nonfarm employment, medican househole incmoe, civilian labor force, resident population, households with income $100,000 or more. The number of fatalities is negatively correlated with homeownerships.

Property damage is positively correlated with population below poverty level, femae employment, federal government insurance, federal government expenditures for disability, federal government total expenditrue, disabled persons enrolled in Medicare, aged persons enrolled in Medicare, total persons enrolled in Medicare, housing value, urban population, disabled social security recipients, social security recipients, IRS income, local governmetn expenditures, local government revenue, people of all ages in poverty, per capita personal income, Asian population, educational attainemtn, public school enrollment, earnings in all industries, unemployment, employment in accomodation and food services, employment in arts, entertainment and recreation services, employment in health care and social assistance, employment in administration, employment in management of companies, employement in professional, scientific, and technical services, employment in real estate, empoloyment in ifnormation, finance and insurance establishments, employment in retail trade, employmetn in manufacturing, employment in construction, employment in utilities, private nonfarm employment, median household income, median age, children,

civilian labor froce, resident population, and households with income $100,000 or more. Crop damage is positively correlated with children in poverty, per capita personal income, and Black population.

The number of injuries is positively correlated with urban population, social secutiy recipient, public school enrollment, employment in retail trade, employment in wholesale trade, employment in manufactuing, employment in construction, employment in utilities, median household income, civilian labor force,, and resident population. The number of injuries is negatively corrleted with children in poverty. Crop damage is negatively correlated with homeownerships, local governmetn expenditures, local government revenue, educational attainment, and households with income $100,000 or more.

4.2.5 Correlation results for Texas

Correlation analysis for the counties of Texas from 1980 to 2010 shows that both the number of fatalities and property damage are positively correlated with population below poverty level female employment, federal government insurance, federal government expenditure for disability, federal government total expenditure, disabled person enrolled in Medicare, aged person enrolled in Medicare, total person enrolled in Medicare, mobile home or trailer, net international migration, ne domestic migration, foreign-born population, social security recipients, disabled social security recipients, IRS income, local government expenditure for health, local government general expenditure, local government revenue, people of all ages in poverty, Asian population, Black population, public school enrollment, earnings in all industries, unemployment, employment in accommodation and food services, employment in arts, entertainment and recreation, employment in health care and social assistance, employment in educational services, employment in administration, employment in management of companies, employment in professional, scientific and technical services, employment in real estate, finance and insurance establishments, employment in information, employment in transportation and warehousing, employment in retail trade, employment in wholesale trade, employment in manufacturing, employment in construction, employment in utilities, employment in mining, employment in forestry, fishing, and agricultural support,

private nonfarm employment, median household income, median age, elderly population, civilian labor force, resident population, households income with $100,000 or more.

The number of fatalities and property damage are negatively correlated with homeownerships, children of age 5-17 in poverty. The number of fatalities is positively correlated with farmworkers, female householders, total housing units, housing value, median gross rent, and urban population. The number of fatalities negatively correlated with unemployment rate. Property damage is negatively correlated with Latino population.

The number of injuries is positively correlated with population below poverty level, IRS income, local government expenditures for health, local government general expenditures, local government revenue, employment in administration, employment in management of companies, employment in real estate, employment in information, employment in transportation, employment in utilities, employment in mining, employment in agricultural sector, and households with income of $100,000 or more.

Crop damage is positively correlated with total cropland, federal government expenditures for disability, federal government expenditure, per capita personal income, employment in information sector, and resident population. Crop damage is negatively correlated with housing value, mobile home or trailer, rural population, Latino population, and unemployment rate.

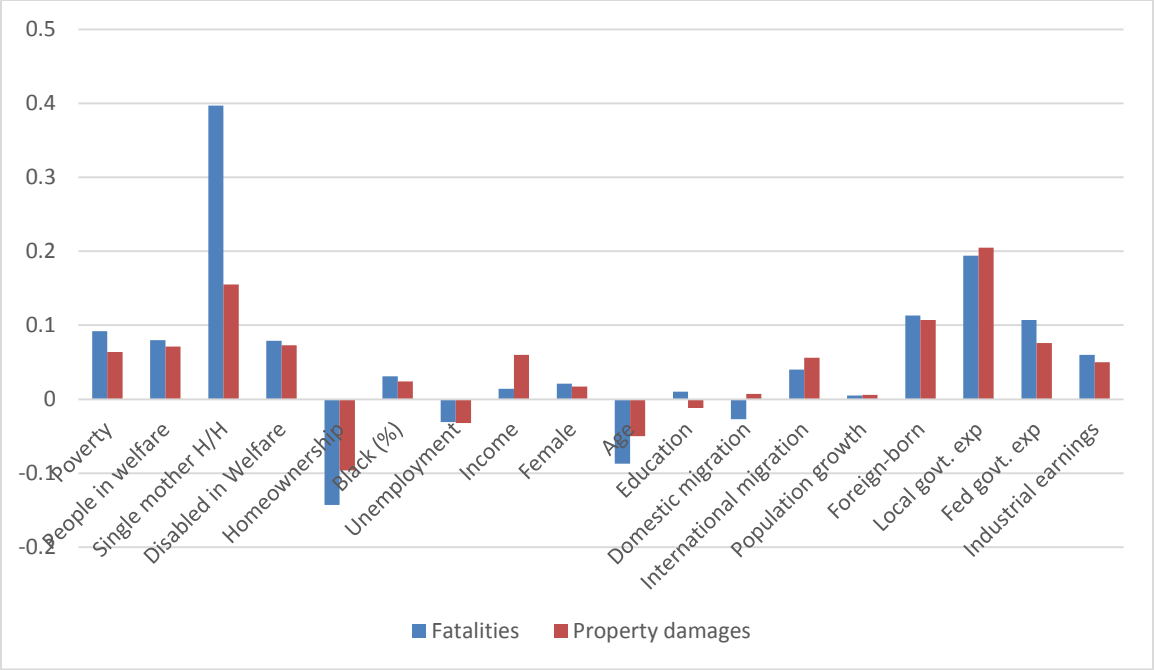

Figure 9: Correlation of variables with fatalities and property damages in the Gulf Coast region

Bivariate correlation of control variables with fatalities and property damages reveal that counties with the highest number of single mother households are strongly and positively correlated with disaster fatalities and property damages. People living below the poverty line, on welfare, or with disabilities and on welfare, are positively correlated with disaster fatalities and property losses. Homeownership rates have a negative correlation with fatalities and property damages. Black populations, foreign-born populations, and female populations have a positive correlation with fatalities and property damages. Unemployment rates and median age are negatively correlated with disaster fatalities and property damages. Both local government expenditures and federal government expenditures increase with the increase of disaster fatalities and property damages. Per capita personal income and earnings of all industries are positively correlated with the severity of natural disasters. An overall sales increase in disaster rehabilitation and reconstruction programs, can lead to higher income.

4.2.5 Descriptive Statistics

Table 7: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Fatalities	16,547	0	510	.24	4.245
Injuries	16,548	0	12,000	2.32	95.00
Property damage	16,549	0	6,031,660,260	9,606,148	146,456,626
Crop damage	16,541	0	701,600,000	1227837.1116	9422025.82
People below poverty	7,476	5	686,928	14,495.83	42,191.10
People in welfare	12,282	10	429,760	14,579.35	35,084.81
Single mother households	1,934	0	219,291.00	3997.3547	12,970.32
Disabled people in welfare	11,214	0	64,915	1,736.01	3,954.84
Homeownership	2,469	20.00	89.70	73.2317	7.79
Black population	5,874	0	86.40	18.64	18.74
Unemployment rate	11,214	0	40.50	6.56	3.22
Per capita income	14,952	211.00	100,711.00	16,757.0484	7,326.53
Median Age	2,136	22.30	62.70	34.97	5.59
Educational attainment	2,136	25.90	97.40	65.79	12.64
Net domestic migration	5,340	-248,723	47,813	329.97	4991.22
Net international migration	5,340	-3,698	40,585	353.34	2269.30
Population Growth	14,960	-9.97	9.99	0.617	4.26
Foreign-born	1,068	0	50.90	5.4019	6.28
Local govt. expenditure	2,670	517.00	13,062,052.00	165,301.08	607,609.30
Local govt. revenue	2,670	553.00	11,939,625.00	168,331.16	609,774.99
Federal govt. expenditure	14,952	-54,856.00	34,433,912.00	469,664.23	1,490,306.72
IRS income	2,670	710.00	91,764,937.00	1,970,513.85	6132874.18
Earnings in all industries	4,272	982	197,109,914	2,211,582.25	9,705,369.41

4.3 Impacts of disaster on poverty conditions

4.3.1 Poverty

Table 8: Predictors of poverty in the Gulf Coast States

	Model (1)	Model (2)	Model ((3)	Model (4)
Observation	524	534	534	534
R^2	0.430	0.175	0.349	0.314
Adjusted R^2	0.420	0.159	0.337	0.301
F	39.53***	11.07***	28.10***	23.96***
Constant	-45,649.90	-30,181.2	-9,438.3	-32,857.9
	(26,283.8)	(30,370.1)	(27,019.8)	(28,861.5)
Alabama	6,966.632	-5,592.2	-3,302.3	8,058.04
	(4,703.13)	(5,179.5)	(4,599.9)	(5,159.98)
Florida	33,501***	21,463.8***	14,567.7***	27,610.5***
	(5,467.1)	(5,279.6)	(4,361.5)	(6,044.1)
Louisiana	7,631.35*	-5,437.96	-5,461.3	3,676.21
	(4,633.9)	(5,279.6)	(4,685.4)	(5,105.2)
Mississippi	--	-13,850.8**	-9,956.43**	--
		(5,516.5)	(4,906.9)	
Texas	11,786.7**	--	--	10,171.03**
	(4,583.2)			(5,039.5)
Black population (%)	27.96	98.3	37.340	71.05
	(93.68)	(112.65)	(100.1)	(102.7)
Unemployment rate	1,166.3	1,205.4	1,127.3	1,386.2
	(845.8)	(1,018.9)	(903.9)	(928.26)
Per capita personal	1.23***	1.90***	1.668***	1.78***
Income	(0.257)	(0.305)	(0.271)	(0.278)
Female population	1,511.95***	1,610.3***	1,125.05**	1,309.2**
	(489.41)	(589.09)	(524.6)	(537.8)
Median Age	-1783.8***	-2,354.5***	-2,134.2***	-2,164.4***
	(313.26)	(589.09)	(332.9)	(341.8)
Fatalities	10,252.93***	--	--	--
	(668.98)			
Injuries	--	-0.644	--	--
		(2.74)		
Property damages	--	--	0.000***	--
			(0.001)	
Crop damages	--	--	--	0.001***
				(0.000)

***p <** .1, **p < .05, ***p < .01, standard errors are in parenthesis

Ordinary Least Square (OLS) regression analyses have been conducted to find out how fatalities, injuries, property, and crop damage influence poverty at county level in the Gulf Coast States controlling for

states, gender, race, unemployment, and age. In model 1 the number of fatalities included. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 43% percent variation in the people below poverty line can be explained by independent variables. Income, gender, and age are significant control variables. Unemployment and ethnicity are not significant. Fatalities are strongly and positively related to the people living below poverty line. Therefore, the increase in the number of fatalities will directly influence the people living below poverty line. In other words, the severity of disaster has an impact on changes people living below poverty.

Model 2 included "injuries" variable and excluded the number of fatalities. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 18% percent variation in the people below poverty line can be explained by independent variables. Income, gender, and age are significant control variables. Unemployment and ethnicity are not significant. However, the number of injuries has no significant influence on the people living in poverty.

The "fatalities" and "injuries" variables are omitted in the model 3, while the variable "property damage" was added. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 35% percent variation in the people below poverty line can be explained by independent variables. Income, gender, and age are significant control variables. Unemployment and ethnicity are not significant. These findings indicate that the property damages are strongly and positively related to the people living in poverty. Therefore, the increase in property damages results in higher number of people living below poverty line.

The variable "crop damage" added and "fatalities", "injuries", and "property damage" excluded in model 4. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 31% percent variation in the people below poverty line can be explained by independent variables. Income, gender, and age are significant control variables. Unemployment and ethnicity are not significant. These findings indicate that the crop damages are strongly and positively related to the people living below poverty. Therefore, the increase in crop damages results in higher poverty at county level. These findings are consistent with H1 that the severity of disaster results in higher poverty at county level in the Gulf Coast region.

4.3.2 Income

4.3.2.1 Income

Table 9: Predictors of Per Capita Income in the Gulf Coast States

	Model (1)	Model (2)	Model ((3)	Model (4)
Observation	524	534	534	534
R^2	0.475	0.463	0.464	0.464
Adjusted R^2	0.465	0.453	0.454	0.454
F	47.41***	45.07***	45.26***	45.36***
Constant	3,554.7	7,850.14**	8,136.03**	3,903.84
	(3,897)	(3,791.7)	(3794.37)	(3,940.32)
Alabama	841.5	-3,251.03***	-3,213.54***	903.30
	(704.9)	(650.44)	(650.721)	(712.17)
Florida	3548***	-462.60	-570.87	3542.0***
	(812.5)	(616.13)	(620.51)	(826.53)
Louisiana	1,185.9*	-2,918.5***	-2,913.02***	1,149.32*
	(691.55)	(669.96)	(669.30)	(701.31)
Mississippi	--	-4161.9***	-4086.76***	--
		(717.17)	(718.94)	
Texas	4,005.9***			4,097.27***
	(709.9)	--	--	(717.51)
Black population (%)	33.9	37.08**	35.968**	36.69**
	(14.3)	(14.44)	(14.45)	(14.42)
Unemployment rate	61.17	68.58	55.46	69.23
	(155.9)	(158.40)	(157.71)	(157.78)
Female population	515.75***	531.15***	522.012***	524.60***
	(70.89)	(71.62)	(71.91)	(71.65)
Median Age	-25.60***	-46.14	-42.607	-42.80
	(70.90)	(47.03)	(47.07)	(47.02)
% People living below poverty	-652.66	-668.56***	-662.36***	-667.52***
line	(46.82)	(51.52)	(51.36)	(51.30)
Fatalities	355.86***	--	--	--
	(98.0)			
Injuries	--	0.256	--	--
		(0.342)		
Property damages	--	--	0.000	--
			(0.000)	
Crop damages	--	--	--	0.000**
				(0.000)

*p < .1, **p < .05, ***p < .01, standard errors are in parenthesis

A regression analysis has been conducted to find out how fatalities, injuries, property, and crop damage influence per capita income at county level in the Gulf Coast States controlling for states, race,

unemployment, gender, age, and poverty. In model 1 the number of fatalities included as test variable. The Prediction model is statistically significant. Gender and age are significant control variables. Unemployment and ethnicity are not significant. The multiple regression analysis shows that approximately 48% percent variation in the per capita income can be explained by independent variables. Fatalities are strongly and positively related to the income. Therefore, the severity of disaster has no negative impact on income.

Model 2 included "injuries" variable and excluded the number of fatalities. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 46% percent variation in the per capita income can be explained by independent variables. Gender and poverty are significant control variables. Ethnicity, unemployment and age are not significant. Injuries have no significant impact on the income.

The "fatalities" and "injuries" variables are omitted in the model 3, while the variable "property damage" was added. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 46% percent variation in the per capita income can be explained by independent variables. Gender and poverty are significant control variables. Ethnicity and age are not significant. However, the property damages has no significant impact on per capita income.

The variable "crop damage" added and "fatalities", "injuries", and "property damage" excluded in model 4. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 46% percent variation in the per capita income can be explained by independent variables. Gender and poverty are significant control variables. Unemployment and age are not significant. The crop damages are positively associated with per capita income. Overall, the severity of disaster does not result in lower per capita income at county level in the Gulf Coast region. Per capita income calculated by overall GDP and population estimation. As previous analysis showed that severity of disaster results in higher number of people living below poverty line, however the overall income increases, it might imply an increasing income inequality from natural disasters.

4.3.3 Employment

4.3.3.1 Unemployment rate

Table 10: Predictors of civilian labor force unemployment rate in the Gulf Coast States

	Model (1)	Model (2)	Model ((3)	Model (4)
Observation	534	534	534	534
R^2	0.617	0.620	0.617	0.618
Adjusted R^2	0.609	0.612	0.609	0.610
F	84.07***	85.17***	84.11***	84.45
Constant	5.598***	4.59***	4.566***	5.573***
	(1.219)	(1.210)	(1.215)	(1.217)
Alabama	-1.107***	-0.074	-0.057	-1.105***
	(0.191)	(0.187)	(0.188)	(0.190)
Florida	-1.070***	-0.030	-0.031	-1.030***
	(0.226)	(0.169)	(0.171)	(0.228)
Louisiana	-0.563***	0.471**	0.484***	-0.540***
	(0.192)	(0.185)	(0.186)	(0.192)
Mississippi	--	1.03***	1.051***	--
		(0.197)	(0.198)	
Texas	-1.046***	--	--	-1.025***
	(0.198)			(0.198)
Black population	0.009**	0.009**	0.009**	0.009**
	(0.004)	(0.004)	(0.004)	(0.004)
Female population	-0.020	-0.020	-0.021	-0.019
	(0.021)	(0.021)	(0.021)	(0.021)
Median Age	0.002	0.002	0.002	0.001
	(0.002)	(0.013)	(0.013)	(0.013)
Educational attainment	-0.028***	-0.029***	-0.028***	-0.028***
	(-0.028)	(0.010)	(0.010)	(0.010)
% People living below poverty line	0.183***	0.182***	0.183***	0.182***
	(0.017)	(0.017)	(0.017)	(0.017)
Fatalities	0.002	--	--	--
	(0.027)			
Injuries	--	0.000**	--	--
		(0.000)		
Property damages	--	--	0.000	--
			(0.000)	
Crop damages	--	--	--	-0.000
				(0.000)

*p < .1, **p < .05, ***p < .01, standard errors are in parenthesis

Four regression have been constructed to find out how fatalities, injuries, property, and crop damage influence unemployment rate at county level in the Gulf Coast States controlling for states, race, gender, age, educational attainment, and poverty. In model 1 the number of fatalities included as test variable. The

Prediction model is statistically significant. The multiple regression analysis shows that approximately 62% percent variation in the unemployment rate can be explained by independent variables. Ethnicity, educational attainment, and poverty are significant control variables; however, gender and age are not significant control variable. However, fatalities from natural disaster have no significant impact on unemployment.

Model 2 included "injuries" variable and excluded the number of fatalities. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 62% percent variation in the unemployment can be explained by independent variables. Ethnicity, educational attainment, and poverty are significant control variables. Gender and age are not significant control variable. Injuries are positively associated with unemployment. Therefore, increase in injuries has no negative impact on unemployment rate.

The "fatalities" and "injuries" variables are omitted in the model 3, while the variable "property damage" was added. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 62% percent variation in the unemployment rate can be explained by independent variables. Ethnicity, educational attainment, and poverty are significant control variables. Gender and age are not significant. However, the property damages has no significant impact on unemployment.

The variable "crop damage" added and "fatalities", "injuries", and "property damage" excluded in model 4. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 62% percent variation in the unemployment rate can be explained by independent variables. Ethnicity, educational attainment, and poverty are significant control variables; however, gender and age are not significant. The crop damages have no significant impact on unemployment. Overall, the severity of disaster does not result in higher unemployment rate at county level in the Gulf Coast region. It is evident from the literature that many low-wage employments are created in the construction sector. People who are employed in minimum-wage employment are still living in poverty. Consequently the poverty increases after natural disaster while the severity of natural disaster has no significant impact on unemployment.

4.3.3.2 Employments

Table 11: Predictors of private nonfarm employments in the Gulf Coast States

	Model (1)	Model (2)	Model ((3)	Model (4)
Observation	1,067	1,067	1,067	1,067
R^2	0.879	0.868	0.868	0.868
Adjusted R^2	0.878	0.867	0.867	0.867
F	856.37***	771.93***	771.96***	771.95***
Constant	-39,936.89	-41,822.33	-41,551.98	-44,449.77
	(26,850.35)	(28,096.61)	(28,101.41)	(29,402.90)
Alabama	-698.89	-158.10	-254.056	2495.30
	(4,823.66)	(5,048.21)	(5,051.22)	(5,467.86)
Florida	-1,039.33	-2,725.41	-2,744.03	-200.163
	(4,501.64)	(4,707.30)	(4,707.16)	(6,395.85)
Louisiana	-4,306.22	-3,807.20	-3,789.13	-1,263.51
	(4,972.35)	(5,203.72)	(5,204.49)	(5,508.97)
Mississippi	-3,388.04	-2,639.12	-2,775.742	--
	(5,243.30)	(5,487.33)	(5,494.94)	
Texas	--	--	--	2,619.44
				(5,488.39)
Black population	116.39	121.57	124.03	121.879
	(100.22)	(104.86)	(105.13)	(104.87)
Female population	-695.54	-729.74	-728.580	-733.59
	(519.71)	(543.88)	(543.82)	(544.14)
Educational attainment	934.94***	983.86***	979.678***	986.53***
	(166.79)	(174.63)	(174.56)	(175.09)
Poverty	2.50***	2.65***	2.650***	2.646***
	(0.035)	(0.033)	(0.034)	(0.034)
Fatalities	11,116.28***	--	--	--
	(1,109.21)			
Injuries	--	1.048	--	--
		(3.806)		
Property damages	--	--	-0.00002	--
			(0.000)	
Crop damages	--	--	--	0.00004
				(0.000)

*p < .1, **p < .05, ***p < .01, standard errors are in parenthesis

Four regression have been constructed to find out how fatalities, injuries, property, and crop damage influence private nonfarm employments at county level in the Gulf Coast States controlling for states, race, gender, educational attainment, and poverty. In model 1 the number of fatalities included as test variable. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 88% percent variation in the private nonfarm employments can be explained by independent variables. Educational attainment and poverty are significant control variables. Ethnicity and gender are not significant. However, fatalities from natural disaster have no significant negative impact on private nonfarm employment.

Model 2 included "injuries" variable and excluded the number of fatalities. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 87% percent variation in the employments can be explained by independent variables. Educational attainment and poverty are significant control variables. Ethnicity and gender are not significant. Increase in injuries has no significant impact on private nonfarm employments.

The "fatalities" and "injuries" variables are omitted in the model 3, while the variable "property damage" was added. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 87% percent variation in the private nonfarm employments can be explained by independent variables. Educational attainment and poverty are significant control variables; however, ethnicity and gender are not significant. Property damages has no significant impact on private nonfarm employments.

The variable "crop damage" added and "fatalities", "injuries", and "property damage" excluded in model 4. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 87% percent variation in the private nonfarm employments can be explained by independent variables. Educational attainment and poverty are significant control variables. Ethnicity and gender are not significant. The crop damages have no significant impact on private nonfarm employments. Overall, the severity of disaster does not result in lower employments rate at county level in the Gulf Coast region. It is evident from the literature that many low-wage employments are created in the construction sector. People who are employed in minimum-wage employment are still living in poverty. Consequently the poverty

increases after natural disaster while severity of natural disaster has no significant impact on private nonfarm employments.

4.4 Impacts of disaster on government finances

4.4.2 Local government general expenditures

Table 12: Predictors of local government general expenditures in the Gulf Coast States

	Model (1)	**Model (2)**	**Model ((3)**	**Model (4)**
Observation	534	534	534	534
R^2	0.362	0.306	0.300	0.300
Adjusted R^2	0.350	0.293	0.286	0.286
F	29.69***	23.09***	22.38***	22.39***
Constant	-2,256,760***	-2,562,467***	-2,571,610***	-2,586,554***
	(674,276)	(701,608)	(705,071)	(704,843)
Alabama	-249,199**	-187,588	-139,170	-140,728
	(122,793)	(128,702)	(127,656)	(127,665)
Florida	509,539***	658,390***	668,159***	667,184***
	(116,019)	(118,872)	(119,387)	(119,369)
Louisiana	-203,861*	-162,941	-201,836	-206,936
	(125,204)	(130,415)	(143,228)	(143,852)
Mississippi	-261,727**	-231,907*	-221,306*	-217,993
	(131,133)	(136,799)	(137,621)	(137,332)
Texas	--	--	--	--
Black population	5,537.10**	4,510.52*	4,139.97	4,210.21
	(2,640.3)	(2,753.18)	(2,764.5)	(2,769.81)
Female population	4,251.20***	7,239.42	6,966.10	7,122.82
	(14,000)	(14,592.8)	(14,675)	(14,665.63)
Per capita income	79.01***	85.77***	86.50***	87.054***
	(7.925)	(8.199)	(8.232)	(8.245)
Unemployment rate	71,789.7***	76,940***	79,414.41***	78,963***
	(20,264)	(21,117)	(21,273)	(21,232)
Net domestic migration	-81.70***	-92.585***	-92.40***	-92.735***
	(9.885)	(10.184)	(10.24)	(10.231)
Fatalities	360,205*** (499,92)	--	--	
Injuries	--	19,126.7** (8,028.7)	--	
Property damages	--	--	0.005 (0.006)	--
Crop damages	--	--	--	0.018 (0.021)

***p <** .1, **p < .05, ***p < .01, standard errors are in parenthesis

Regression analyses have been conducted to find out how fatalities, injuries, property, and crop damage influence local government expenditure at county level in the Gulf Coast States controlling for states, gender, race, income, unemployment rate, and net domestic migration. In model 1, the number of fatalities included. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 36% percent variation in the local government expenditure can be explained by independent variables. Fatalities are strongly and positively related to the local government expenditure. All control variables, namely ethnicity, gender, income, unemployment, and net domestic migration are significant. Therefore, the increase in the number of fatalities will directly increase the spending of local governments. In other words, the severity of disaster has a positive impact on the local government expenditure.

Model 2 included "injuries" variable and excluded the number of fatalities. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 31% percent variation in the local government expenditure can be explained by independent variables. Ethnicity, income, unemployment, and domestic migration are significant control variables. Gender is not significant. These findings indicate that injuries are strongly and positively related to the local government spending. Therefore, the increase in injuries results in higher local government expenditure.

The "fatalities" and "injuries" variables are omitted in the model 3, while the variable "property damage" was added. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 30% percent variation in the local government's expenditure can be explained by independent variables. Income, unemployment, and domestic migrations are significant control variables. Ethnicity is not significant. However, the property damages have no significant impact on local government expenditure. This is might be due to most of the property damages are covered by the federal government insurance program and private sector insurance companies.

The variable "crop damage" added and "fatalities", "injuries", and "property damage" excluded in model 4. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 30% percent variation in the local expenditure can be explained by independent variables. Income, unemployment, and domestic migrations are significant control variables; however, ethnicity is not significant. Test variable crop damages have no significant impact on local government expenditure. This

finding is consistent with H2 that the human cost of disaster results in higher spending of local government at county level in the Gulf Coast region.

4.4.4 Local Government's General Revenue

Table 13: Predictors of local government general revenue in the Gulf Coast States

	Model (1)	**Model (2)**	**Model ((3)**	**Model (4)**
Observation	534	534	534	534
R^2	0.377	0.318	0.311	0.311
Adjusted R^2	0.367	0.306	0.299	0.299
F	35.30***	27.11***	26.28***	26.23***
Constant	-2,045,278*** (242,846)	-2,219,919*** (252,957.7)	-2,241,892*** (254,469)	-2,248,931.25*** (254,950.1)
Alabama	-235,219** (116,797)	-167,921.76 (122,845.33)	-119,280.7 (121,824.8)	-120,445.79 (121,849.90)
Florida	527,326*** (110,975)	674,630.28*** (114,201.51)	684,918.87*** (114,750.8)	683,682.32*** (114,737.59)
Louisiana	-186,464 (120,709)	-142,815.87 (126,206.68)	-184,054.09 (138,882.38)	-185,402.33 (139,454.15)
Mississippi	-244,449** (124,822)	-209,182.03 (130,691.9)	-199,196.79 (131,602.30)	-195,023.58 (131,280.68)
Texas	--	--	--	--
Black population	5,412.20** (2,552.11)	4,389.343 (2,671.78)	4,017.03 (2,683.62)	4,074.395 (2,689.05)
Per capita income	78.77*** (7.308)	86.158*** (7.573)	86.83*** (7.607)	87.409*** (7.616)
Unemployment rate	71,806*** (19,408.6)	77,637.298*** (20,301.05)	80,132.20*** (20,450.75)	79,635.17*** (20,418.29)
Net domestic migration	-81.31*** (9.548)	-92.245*** (9.877)	-92.056*** (9.935)	-92.40*** (9.928)
Fatalities	365,096*** (48323)	--	--	--
Injuries	--	19,410.98** (7794.73)	--	--
Property damages	--	--	0.005 (0.006)	--
Crop damages	--	--	--	0.018 (0.020)

*p < .1, **p < .05, ***p < .01, standard errors are in parenthesis

Regression analyses have been conducted to find out how fatalities, injuries, property, and crop damage influence local government's general revenue at county level in the Gulf Coast States controlling for states, race, income, unemployment rate, and net domestic migration. In model 1 the number of fatalities included. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 38% percent variation in the local government revenue can be explained by independent variables. Ethnicity, income, unemployment, and net domestic migration are significant control variables. Fatalities are strongly and positively related to the local government's general revenue. Therefore, the increase in of fatalities does not have any negative impact on local government's revenue.

Model 2 included "injuries" variable and excluded the number of fatalities. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 32% percent variation in the local government revenue can be explained by independent variables. Income, unemployment, and net domestic migration are significant control variable. Ethnicity is not significant. These findings indicate that injuries are strongly and positively related to the local government's general revenues. Therefore, the increase in injuries does not have any negative impact on local government revenue. As per capita income increases and unemployment rate decreases with the increase in disaster severity, these might result in higher local government revenue.

The "fatalities" and "injuries" variables are omitted in the model 3, while the variable "property damage" was added. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 31% percent variation in the local government's revenue can be explained by independent variables. Income, unemployment, and net domestic migration are significant control variable. Ethnicity is not significant control variable. However, the property damages have no significant impact on local government's revenue.

The variable "crop damage" added and "fatalities", "injuries", and "property damage" excluded in model 4. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 31% percent variation in the local revenue can be explained by independent variables. Income, unemployment, and net domestic migration are significant control variable. However, crop damages have no

significant impact on local government's revenue. Overall, the severity of natural disaster does not result in decrease in local government's revenue.

4.4.7 Federal Government Expenditure

Table 14: Predictors of federal government expenditure in the Gulf Coast States

	Model (1)	**Model (2)**	**Model ((3)**	**Model (4)**
Observation	4272	4272	4272	4271
R^2	0.203	0.192	0.199	0.205
Adjusted R^2	0.201	0.190	0.198	0.203
F	120.36***	112.55***	117.96	121.89***
Constant	-1,806,865***	-1,733,349***	-1,759,071***	-1,727,457***
	(140,331)	(140,952)	(140,334)	(139,825)
Alabama	113,046.40	96,954.74	90,832.93	146,626.09
	(88,852.79)	(89,423.11)	(89,012.14)	(88,997.55)
Florida	1,081,510.61***	1,079,867.12***	1,051,450.55***	1,052,121.21***
	(81,771.84)	(82,318.81)	(82,061.76)	(81,743.09)
Louisiana	-216,828.99**	-201,060.23**	-261,718.13***	-167,777.68*
	(91,312.51)	(91,900.47)	(91,981.89)	(91,271.65)
Mississippi	-385,288.37***	-389,151.82***	-420,021.11***	-380,422.44***
	(94,452.55)	(95,081.36)	(94,769.87)	(94,350.22)
Texas	--	--	--	--
Black population	11,764.19***	12,471.20***	12,626.58***	12,019.36***
	(1,946.62)	(1,957.31)	(1,948.46)	(1,943.01)
Per capita income	84.52***	83.45***	83.592***	81.53***
	(3.693)	(3.715)	(3.698)	(3.694)
Unemployment	25,165.61*	16,090.09	19,584.97	15,549.72
rate	(14,855.43)	(14,907.37)	(14,846.92)	(14,788.77)
Net domestic	-58.64***	-59.40***	-59.54***	-59.49***
migration	(4.594)	(4.624)	(4.60)	(4.588)
Fatalities	22,724.26*** (3014.45)	--	--	--
Injuries	--	10.85 (134.53)	0.001*** (0.000)	--
Property damages	--		--	--
Crop damages	--			0.020*** (0.002)

*p < .1, **p < .05, ***p < .01, standard errors are in parenthesis

Regression analyses have been conducted to find out how fatalities, injuries, property, and crop damage influence federal government expenditure in the counties of Gulf Coast States controlling for states, race, income, unemployment rate, and net domestic migration. In model 1 the number of fatalities included.

The Prediction model is statistically significant. The multiple regression analysis shows that approximately 20% percent variation in the federal government expenditure can be explained by independent variables. Ethnicity, income, unemployment, and net domestic migration are significant control variables. Fatalities are strongly and positively related to the federal government expenditure. Therefore, the increase in the number of fatalities will directly increase the spending of the federal government. In other words, the fatalities from natural disaster have a positive impact on the federal government expenditure.

Model 2 included "injuries" variable and excluded the number of fatalities. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 19% percent variation in the federal government's expenditure can be explained by independent variables. Ethnicity, income, and net domestic migration are significant control variables; however, unemployment is not significant. These findings indicate that have no significant impact on the federal government's spending.

The "fatalities" and "injuries" variables are omitted in the model 3, while the variable "property damage" was added. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 20% percent variation in the federal government's expenditure can be explained by independent variables. Ethnicity, income, and net domestic migration are significant control variables. Unemployment is not significant. Property damages are strongly and positively related to the federal government expenditure.

The variable "crop damage" added and "fatalities", "injuries", and "property damage" excluded in model 4. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 21% percent variation in the federal government's expenditure can be explained by independent variables. Ethnicity, income, and net domestic migration are significant control variables; however, unemployment is not significant. Crop damages are strongly and positively associated with the federal government expenditure. These findings are consistent with H2 that the severity of disaster results in higher spending of federal government in the Gulf Coast region.

4.4.10 Gross Income- IRS

Table 15: Predictors of IRS gross income in the Gulf Coast States

	Model (1)	**Model (2)**	**Model ((3)**	**Model (4)**
Observation	2092	2092	2092	2091
R^2	0.217	0.217	0.222	0.229
Adjusted R^2	0.213	0.213	0.218	0.226
F	57.66***	57.72***	59.32***	61.88***
Constant	-7,091,305***	-6,880,748***	-7,082,562***	-8,814,030***
	(671,269.74)	(667,892.11)	(666,217.36)	(819,886.29)
Alabama	505,320.29	434,522.23	436,225.10	2,661,881.40***
	(438,501.81)	(438,152.39)	(436,706.68)	(488,484.74)
Florida	2,790,552.50***	2,650,816.63***	2,625,129.94***	4,645,885.89***
	(413,270.85)	(416,962.97)	(413,497.14)	(534,893.93)
Louisiana	-1,346,898***	-1,343,498***	-1,613,830***	910,981.38*
	(446,197.04)	(446,088.37)	(450,077.99)	(478,876.59)
Mississippi	-1,982,450***	-1,987,984***	-2,136,362***	--
	(464,693.53)	(464,642.19)	(464,714.45)	
Texas	--	--	--	1,997,337.59***
				(461,185.03)
Black population	37,875.53***	39,820.39***	40,760.45***	37,377.23***
	(9,694.70)	(9,671.47)	(9,646.07)	(9,603.39)
Per capita income	278.97***	274.99***	279.50***	269.72***
	(16.49)	(16.48)	(16.42)	(16.37)
Unemployment	19,1257.91***	166,681.87**	182,373.44**	147,033.17*
rate	(78,426.41)	(77,931.14)	(77,696.48)	(77,414.29)
Net domestic	-199.56***	-206.10***	-201.79***	-204.60***
migration	(30.41)	(30.43)	(30.29)	(30.15)
Population	544,995.48***	544,940.54***	546,654.50***	534,608.29***
growth	(73,319.83)	(73,310.46)	(73,090.48)	(72,779.27)
Fatalities	21,564.29**	--	--	--
	(10,253.72)			
Injuries	--	33,326.08**	--	--
		(14,967.61)		
Property damages	--	--	0.001***	--
			(0.000)	
Crop damages	--	--	--	0.067***
				(0.011)

***p <** .1, **p < .05, ***p < .01, standard errors are in parenthesis

Regression analyses have been conducted to find out how fatalities, injuries, property, and crop damage influence gross income of internal revenue service in the Gulf Coast States controlling for states, race, income, unemployment rate, net domestic migration, and population growth. In model 1 the number of fatalities included. The Prediction model is statistically significant. The multiple regression analysis shows

that approximately 22% percent variation in gross IRS income can be explained by independent variables. Ethnicity, income, unemployment, net domestic migration, and population growth are significant control variables. Fatalities are strongly and positively related to the IRS income. Therefore, the increase in of fatalities will raise the IRS income.

Model 2 included "injuries" variable and excluded the number of fatalities. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 22% percent variation in the IRS income can be explained by independent variables. All control variables, namely, ethnicity, income, unemployment, net domestic migration, and population growth are significant. These findings indicate that injuries have positive impact on IRS income.

The "fatalities" and "injuries" variables are omitted in the model 3, while the variable "property damage" was added. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 22% percent variation in the IRS income can be explained by independent variables. Ethnicity, income, unemployment, net domestic migration, and population growth are significant control variables. Property damages are strongly and positively related to the IRS income.

The variable "crop damage" added and "fatalities", "injuries", and "property damage" excluded in model 4. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 23% percent variation in the IRS gross income can be explained by independent variables. All control variables are significant. Crop damages are strongly and positively associated with the IRS income. Overall, the severity of disaster does not have a negative IRS gross income in the Gulf Coast region.

4.4.9 Earning in All Industries

Table 16: Predictors of earnings in all industries in the Gulf Coast States

	Model (1)	Model (2)	Model ((3)	Model (4)
Observation	525	525	525	525
R^2	0.626	0.425	0.445	0.435
Adjusted R^2	0.618	0.414	0.435	0.424
F	85.87***	37.99***	51.14***	39.54***
Constant	-4,156,649.83 (3,111,944.75)	-3,193,226.54 (3,859,579.73)	-3,145,211.13 (3,789,675.39)	-3,492,028.48 (3,955,581.72)
Alabama	-3,666.28 (705,133.87)	350,350.61 (873,624.27)	345,523.23 (858,399.11)	255,924.39** (1,073,918.65)
Florida	3,216,608.09*** (721,393.89)	3,386,043.13*** (894,239.45)	2,787,835.67*** (890,013.57)	2,855,873.93 (1,136,851.01)
Louisiana	-232,059.72 (727,628.0)	-46,155.25 (901,743.84)	-189,431.98 (886,794.44)	-396,098.90
Mississippi	-207,684.37 (701,894.43)	125,853.75 (869,502.66)	174,177.49 (854,556.76)	--
Texas	--	--	--	-235,890.79 (1,058,125.77)
Per capita income	558.60*** (56.91)	752.25*** (69.02)	717.21*** (68.34)	736.87*** (862693.22)
Unemployment rate	386,949.91** (161,281.0)	534,461.89*** (199,674.04)	500,970.01** (196,304.64)	537,933.99*** (68.63)
Net domestic migration	-3,504.20*** (301.45)	-4,848.62*** (359.81)	-4,478.62*** (364.09)	-4,620.41*** (197,838.95)
Population growth	486,908.54*** (143,328.37)	676,848.25*** (177,054.12)	631,359.31*** (174,326.53)	669,712.71*** (364.73)
Homeownership	-117,929.21*** (31,164.73)	-189,125.38*** (3,8273.77)	-178,679.22*** (37,672.56)	-179,962.54*** (175,550.53)
Fatalities	2,180,022.65*** (131338.90)	--	--	--
Injuries	--	-212.03 (525.50)	--	--
Property damages	--	--	0.086*** (0.020)	--
Crop damages	--	--	--	0.050*** (0.017)

*p < .1, **p < .05, ***p < .01, standard errors are in parenthesis

Regression analyses have been conducted to find out how fatalities, injuries, property, and crop damage influence earnings of all industries in the Gulf Coast States controlling for states, race, income, unemployment rate, net domestic migration, population growth, and homeownership. In model 1 the number

of fatalities included. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 63% percent variation in earnings of all industries can be explained by independent variables. Income, unemployment, net domestic migration, population growth, homeownership are significant control variables. Fatalities are strongly and positively related to the earnings of all industries.

Model 2 included "injuries" variable and excluded the number of fatalities. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 43% percent variation in the earnings of all industries can be explained by independent variables. Income, unemployment, net domestic migration, population growth, homeownership are significant control variables. These findings indicate that injuries have no significant impact on earnings of all industries.

The "fatalities" and "injuries" variables are omitted in the model 3, while the variable "property damage" was added. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 45% percent variation in the earnings of all industries can be explained by independent variables. Income, unemployment, net domestic migration, population growth, homeownership are significant control variables. Property damages are strongly and positively related to the earnings of all industries.

The variable "crop damage" added and "fatalities", "injuries", and "property damage" excluded in model 4. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 44% percent variation in the earnings of all industries can be explained by independent variables. Income, unemployment, net domestic migration, population growth, homeownership are significant control variables. Crop damages are strongly and positively associated with the earnings of all industries. Overall, the severity of disaster results in higher earnings of all industries in the Gulf Coast region. This might be due to well preparedness of business sector and massive post-disaster reconstruction works that lead to the overall increases in sales, and the earnings of industries suffer no negative consequences from natural disasters in the long-run.

4.4.9 Population Growth

Table 17: Predictors of change in population in the Gulf Coast States

	Model (1)	Model (2)	Model ((3)	Model (4)
Observation	4,202	4,202	4,202	4,201
R^2	0.160	0.160	0.160	0.161
Adjusted R^2	0.158	0.158	0.158	0.159
F	88.61***	88.62***	88.61***	89.07***
Constant	0.486**	0.483**	0.486**	0.489**
	(0.209)	(0.208)	(0.208)	(0.208)
Alabama	0.034	0.034	0.034	0.020
	(0.111)	(0.111)	(0.111)	(0.112)
Florida	0.970***	0.971***	0.971***	0.975***
	(0.115)	(0.115)	(0.115)	(0.115)
Louisiana	0.094	0.093	0.096	0.087
	(0.113)	(0.113)	(0.114)	(0.113)
Mississippi	0.276**	0.276**	0.277**	0.278
	(0.110)	(0.110)	(0.110)	(0.110)
Texas	--	--	--	--
Per capita income	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Net domestic migration	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Net international migration	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Unemployment rate	-0.127***	-0.127***	-0.127***	-0.126***
	(0.020)	(0.000)	(0.020)	(0.020)
Fatalities	0.000	--	--	--
	(0.004)			
Injuries	--	0.00004	--	--
		(0.000)		
Property damages	--	--	0.000	--
			(0.000)	
Crop damages	--	--	--	-0.000*
				(0.000)

***p <** .1, **p < .05, ***p < .01, standard errors are in parenthesis

Regression analyses have been conducted to find out how fatalities, injuries, property, and crop damage influence population growth in the Gulf Coast States controlling for states, income, net domestic migration, net international migration, and unemployment rate. In model 1 the number of fatalities included. The Prediction model is statistically significant. Income, net domestic migration, net international migration, and unemployment are significant control variables. The multiple regression analysis shows that

approximately 16% percent variation in population change can be explained by independent variables. However, fatalities are not significantly associated with population growth.

Model 2 included "injuries" variable and excluded the number of fatalities. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 16% percent variation in the population growth can be explained by independent variables. Income, net domestic migration, net international migration, and unemployment are significant control variables. These findings indicate that injuries have no significant impact on population growth.

The "fatalities" and "injuries" variables are omitted in the model 3, while the variable "property damage" was added. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 16% percent variation in the population growth can be explained by independent variables. Income, net domestic migration, net international migration, and unemployment are significant control variables. Property damages have no significant impact on population growth.

The variable "crop damage" added and "fatalities", "injuries", and "property damage" excluded in model 4. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 16% percent variation in the population growth can be explained by independent variables. Income, net domestic migration, net international migration, and unemployment are significant control variables. Crop damages are negatively associated with the population growth. Overall, the severity of disaster has no significant impact on the change in population.

4.5 Impacts of poverty conditions on disaster losses

Table 18: Prediction of fatalities from poverty variables in the Gulf Coast States

	Model (1)	Model (2)	Model ((3)	Model (4)	Model(5)
Observation	534	534	467	534	534
R^2	0.343	0.227	0.360	0.245	0.068
Adjusted R^2	0.330	0.212	0.347	0.231	0.050
F	27.29***	15.36	28.56***	16.99	3.79***
Constant	1.188	2.328	1.220	2.269	2.589
	(1.475)	(1.618)	(1.534)	(1.596)	(1.927)
Alabama	0.113	-0.082	--	-0.227	0.146
	(0.235)	(0.254)		(0.251)	(0.285)
Florida	-0.632***	-1.110	-0.726***	-1.085***	-0.003
	(0.216)	(0.246)	(0.221)	(0.241)	(0.259)
Louisiana	0.023	-0.090	0.203	-0.156	0.077
	(0.238)	(0.258)	(0.256)	(0.255)	(0.286)
Mississippi	0.195	0.001	0.083	-0.101	0.085
	(0.250)	(0.271)	(0.278)	(0.267)	(0.302)
Texas	--	--	--	--	--
Per capita income	0.000	0.000	0.000	0.000	0.00006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female population	-0.036	-.043	-0.028	-0.043	-0.003
	(0.026)	(0.029)	(0.027)	(0.028)	(0.031)
Black population	0.003	0.006	0.002	0.005	0.003
	(0.005)	(0.005)	(0.006)	(0.005)	(0.006)
Educational attainment	0.008	-0.002	0.003	-0.004	-0.003
	(-0.019)	(0.013)	(0.012)	(0.013)	(0.014)
Unemployment	-0.019	-0.019	-0.001	-0.003	0.032
	(0.052)	(0.057)	(0.055)	(0.056)	(0.062)
People living below poverty	0.00003*** (0.000)	-	--		--
People in welfare	--	0.000026*** (0.000)	--		--
Single mother households	--	--	0.000083***		--
Disabled people in welfare	--	--	--	0.000*** (0.000)	--
Homeownership					-0.046*** (0.011)

***p <** .1, **p < .05, ***p < .01, standard errors are in parenthesis

Regression analyses have been conducted to find out how poverty conditions influence fatalities in natural disasters in the Gulf Coast States controlling for income, gender, race, educational attainment, and unemployment. In model 1 the variable "people living below poverty line" was included. The Prediction

model is statistically significant. The multiple regression analysis shows that approximately 34% percent variation in the fatalities can be explained by independent variables. Income, gender, ethnicity, education, and unemployment are not significant control variable. People living below poverty line are strongly and positively related to fatalities in natural disasters.

Model 2 included "people in welfare" variable and excluded people living below poverty line variable. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 23% percent variation in the fatalities can be explained by independent variables. Gender, income, ethnicity, education, and unemployment are not significant control variable. These findings indicate that people in welfare are strongly and positively related to disaster fatalities.

The "people living below poverty line" and "people in welfare" variables are omitted in the model 3, while the variable "single mother households" was added. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 36% percent variation in the fatalities in natural disasters can be explained by independent variables. Gender, income, ethnicity, education, and unemployment are not significant control variable. Single mother households are strongly and positively related to the fatalities in natural disasters.

The variable "Disabled persons in welfare" added and "people living below poverty line", "people in welfare", and "single mother households" excluded in model 4. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 23% percent variation in the fatalities from natural disasters can be explained by independent variables. Gender, ethnicity, education, income and unemployment are not significant control variable. Disabled persons in welfare are strongly and positively associated with the fatalities in natural disasters. Overall, the higher poverty conditions result in higher fatalities from natural disaster at county level in the Gulf Coast region.

The variable "homeownership" added and "people living below poverty line", "people in welfare, "single mother households", and "disabled persons in welfare" omitted in model 5. The multiple regression analysis shows that approximately 7% percent variation in the fatalities from natural disasters can be explained by independent variables. Income is significant control variable; however, gender, ethnicity,

education, and unemployment are not significant. Homeownership is strongly and negatively associated with the fatalities in natural disasters. If we consider homeownership rate as a proxy for wealth, poverty lead to higher fatalities in natural disasters. These findings are consistent with H3 that higher poverty conditions result in higher fatalities from natural disaster at county level in the Gulf Coast region.

Table 19: Prediction of total disaster losses from poverty conditions in the Gulf Coast States

	Model (1)	**Model (2)**	**Model ((3)**	**Model (4)**	**Model(5)**
Observation	534	534	534	467	534
R^2	0.222	0.268	0.225	0.251	0.050
Adjusted R^2	0.206	0.252	0.208	0.235	0.031
F	13.58***	17.35***	13.76***	15.31***	2.73***
Constant	8,697.47	40,781.65	32,277.50	10,157.56	17,607.94
	(26,999.65)	(26,483.36)	(27,204.54)	(29,180.36)	(32,654.76)
Alabama	-4,257.97	-6,858.44	-9,892.93	--	-4,610.52
	(4,596.18)	(4,436.40)	(4,555.68)		(4,829.39)
Florida	5,360.05	-5,968.03	-4,016.74	2,985.41	12,897.49***
	(4,364.61)	(4,355.74)	(4,468.0)	(4,637.38)	(4,391.87)
Louisiana	3,554.68	1,890.04	242.49	6,052.93	3,724.99
	(4,604.94)	(4,457.29)	(4,581.54)	(5,112.25)	(4,850.13)
Mississippi	-2,642.12	-4,439.06	-6,975.34	-3,892.76	-4,812.98
	(4,736.32)	(4,573.24)	(4,692.34)	(5,407.86)	(5,120.26)
Texas	--	--	--	--	--
Per capita income	-0.198	-0.586*	-0.361	-0.377	0.502
	(0.313)	(0.309)	(0.316)	(0.334)	(0.326)
Female population	352.59	54.56	182.09	450.92	790.14
	(485.69)	(473.55)	(486.67)	(518.66)	(531.39)
Black population	33.68	49.32	50.12	19.02	54.22
	(92.38)	(89.44)	(92.09)	(117.30)	(105.26)
Educational attainment	-231.29	-354.58	-430.43	-275.65	-374.72
	(235.20)	(227.02)	(233.28)	(254.72)	(240.27)
Unemployment	-1227.41	-1391.15	-1074.73	-1117.42	-617.46
	(955.68)	(927.86)	(953.86)	(1,035.99)	(1,057.97)
Housing value	-0.004	0.003	0.034	0.006	--
	(0.071)	(0.068)	(.070)	(0.075)	
People living below poverty	0.389***	--	--	--	--
	(0.035)				
People in welfare	--	0.484***	--	--	--
		(0.038)			
Disabled people in welfare	--	--	4.230***	--	--
			(0.389)		
Single mother households	--	--	--	1.182***	--
				(0.105)	
Homeownership					-648.23***
					(180.34)

***p <** .1, **p < .05, ***p < .01, standard errors are in parenthesis

Regression analyses have been conducted to find out how poverty conditions influence total losses (in thousand dollars) in natural disasters in the Gulf Coast States controlling for income, gender, race, educational attainment, unemployment, and housing value. The aggregate loss has been calculated by summing up property and crop losses. In model 1 the variable "people living below poverty line" was included. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 22% percent variation in the disaster losses can be explained by independent variables. Income, gender, ethnicity, education, unemployment, and housing value are not significant control variable. People living below poverty line are strongly and positively related to the total economic losses from natural disasters.

Model 2 included "people in welfare" variable and excluded people living below poverty line variable. The Prediction model is statistically significant. Income is significant control variable; however, gender, ethnicity, education, unemployment, and housing value are not significant. The multiple regression analysis shows that approximately 27% percent variation in the disaster losses can be explained by independent variables. These findings indicate that people in welfare are strongly and positively related to disaster losses.

The "people living below poverty line" and "people in welfare" variables are omitted in the model 3, while the variable "disabled persons in welfare" was added. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 23% percent variation in the total losses in natural disasters can be explained by independent variables. Income, gender, ethnicity, education, unemployment, and housing value are not significant control variable. Disabled persons in welfare are strongly and positively related to the total losses in natural disasters.

The variable "single mother households" added and "people living below poverty line", "people in welfare", and "disabled people in welfare" excluded in model 4. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 25% percent variation in the losses from natural disasters can be explained by independent variables. Income, gender, ethnicity, education,

unemployment, and housing value are not significant control variable. Single mother households are strongly and positively associated with the total losses in natural disasters. Overall, the higher poverty conditions result in higher losses from natural disaster at county level in the Gulf Coast region.

The variable "homeownership" added and "people living below poverty line", "people in welfare, "single mother households", "housing value", and "disabled persons in welfare" omitted in model 5. The multiple regression analysis shows that approximately 5% percent variation in the property losses from natural disasters can be explained by independent variables. Income, gender, ethnicity, education, unemployment, and housing value are not significant control variable. Homeownership is strongly and negatively associated with the economic losses in natural disasters. If we consider homeownership rate as a proxy for wealth, poverty lead to higher economic losses in natural disasters. The overall analyses are consistent with H3 that higher poverty conditions result in higher financial damages from natural disaster at county level in the Gulf Coast region.

4.6 Impacts of poverty conditions on social vulnerability

Table 20: Prediction of SOVI in the Gulf Coast States

	Model (1)	Model (2)	Model ((3)	Model (4)
Observation	534	534	534	534
R^2	0.681	0.682	0.701	0.710
Adjusted R^2	0.673	0.673	0.693	0.702
F	85.32***	79.52***	93.65***	97.12***
Constant	-28.67***	-28.19***	-33.08***	-37.55***
	(2.19)	(2.21)	(2.29)	(2.51)
Income	0.00006**	0.000**	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Female	0.355***	0.353***	0.343***	0.388***
	(0.048)	(0.048)	(0.046)	(0.045)
Hispanic	0.111***	0.110***	0.086***	0.074***
	(0.008)	(0.009)	(0.008)	(0.008)
Asian	0.426***	0.475***	0.387***	0.428***
	(0.147)	(0.150)	(0.138)	(0.134)
Black	0.102***	0.101***	0.076***	0.061***
	(0.007)	(0.007)	(0.008)	(0.009)
Children	0.922***	0.921***	0.903***	0.953***
	(0.168)	(0.167)	(0.159)	(0.157)
Elderly	0.409***	0.395***	0.340***	0.343***
	(0.036)	(0.037)	(0.036)	(0.036)
Foreign-born	-0.031	-0.022	--	--
	(0.029)	(0.029)		
Domestic migration	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Gross Rent	0.000	0.000	--	
	(0.002)	(0.002)		
Federal insurance	0.000	-0.000	--	
	(0.000)	(0.000)		
Educational attainment	-0.067***	-0.068***	-0.021	0.009
	(0.023)	(0.023)	(0.021)	(0.021)
Poverty	0.000*	--	--	0.234
	(0.000)			(0.034)
International migration	--	0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)
People in Welfare	--	0.000**	--	
		(0.000)		
Federal expenditure	--	--	0.000**	
			(0.000)	
Poverty in people under 18	--	--	0.132***	--
			(0.024)	
Housing Value			--	0.000***
				(0.000)
People in Medicare			--	0.000***
				(0.000)

*p < .1, **p < .05, ***p < .01, standard errors are in parenthesis

Regression analyses have been conducted to find out how poverty conditions influence Social Vulnerability Index (SOVI) in the Gulf Coast States controlling for income, gender, ethnicity, educational attainment, unemployment, and housing value. In model 1 the variable "people living below poverty line" was included. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 68% percent variation in the social vulnerability index can be explained by independent variables. Income, gender, Hispanic population, Asian population, Black population, children, elderly population, educational attainments are significant variables. However, net domestic migration, gross housing rent, and federal insurance are not significant. People living below poverty line are positively related to the social vulnerability.

Model 2 included "people in welfare" and "net international migration" variables and excluded people living below poverty line variable. The Prediction model is statistically significant. Income is significant control variable; however, gender, ethnicity, education, unemployment, and housing value are not significant. The multiple regression analysis shows that approximately 27% percent variation in the disaster losses can be explained by independent variables. Income, gender, Hispanic population, Asian population, Black population, children, elderly population, educational attainments are significant variables. However, domestic migrations, housing rent, federal insurance are not significant. People in welfare are strongly and positively related to the social vulnerability.

The "people in welfare" variables are omitted in the model 3, while the variable "people under the age of 18 in poverty" and federal expenditure were added. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 70% percent variation in the social vulnerability index can be explained by independent variables. Income, gender, Hispanic population, Asian population, Black population, children, elderly population, and federal expenditure are significant variables. However, net domestic migration, educational attainment, and international migration are not significant. The variable People under the age of 18 in poverty is strongly and positively related to the social vulnerability index.

The variable "people enrolled in Medicare" and "housing value" are added and "people under 18 living below poverty line", and "federal expenditure" excluded in model 4. The Prediction model is statistically significant. The multiple regression analysis shows that approximately 71% percent variation in

the social vulnerability can be explained by independent variables. . Income, gender, Hispanic population, Asian population, Black population, children, elderly populations, and housing value are significant variables. However, net domestic migration, educational attainment, people living below poverty, and international migrations are not significant. The number of people enrolled in Medicare is strongly and positively related to the social vulnerability index. These findings are consistent with H4 that higher poverty conditions in counties lead to the higher social vulnerability from disasters.

4.7 Addressing Multicollinearity

Multicollinearity refers to a situation in which two or more explanatory variables in a multiple regression model are strongly and linearly correlated. To address the question of multicollinearity, the independent variables were checked for how strongly they are correlated. For instances, fatalities and property damages are moderate to strongly correlated (overall, 0.047). In predicting fatalities and economic losses from poverty variables it was found that people living below poverty is highly correlated with people in welfare, single mother households, and homeownership rates. In order to avoid multicollinearity these variable were inserted in rotation in five consecutive regression models. In addition to the correlation test, Variance Inflation Factor (VIF) and tolerance score test were also performed. A tolerance of less than 0.20 and/or a VIF of 5 and above indicates a multicollinearity problem and consequently one of the correlated variables was omitted from the equation. All tolerance scores were higher than 0.20 and VIF scores were lower than 5 in every regression model confirmed that there is no multicollinearity issue.

4.8 Summary of results

The regression analysis for the Gulf Coast states reveals that the number of people living below poverty line is significantly influenced by fatalities, property damages, and crop damages from natural disaster. It implies that natural disasters exacerbate poverty conditions. Natural disaster losses are positively associated with per capita income and median household income. As poverty rates, per capita income, and median household income have increased with the increase in disaster losses, it might indicate that natural disaster is a factor that results in an increased income inequality. It is evident from existing literature that the well-off people and businesses profit from the reconstruction efforts aftermath of a disaster whereas the

marginalized people who are living near to the poverty line fall below the poverty line. The results are consistent with the existing discourse of political economy of natural disaster.

The unemployment rate decreases with the increase in disaster losses. It is consistent with the existing literature that natural disasters have no long-term impact on employments. Moreover, additional employments are generated during the reconstruction period. As the employments and people living below poverty line, both increases with the increase of natural disaster losses, it implies the creation of many low-wage employments. People might be employed in low-wage jobs, such as laborer in construction industries, and still might have been living below the poverty line. The increased employments are not the sole the determinant of poverty conditions.

The losses from natural disasters do not have any impact on the natural population growth in the Gulf Coast states. People might not consider natural disaster as a factor for their locational choice due to the advancement in forecasting and warning system. As a result of scientific innovations, people can afford ample time for evacuation. Many of the vulnerable sites are also exotic places for tourist attraction and have many service sector employments to attract population. Federal and private insurance coverage in disaster prone areas have also played a role in consistent population growth.

Natural disasters have also created a significant financial burden on local and federal governments. Local governments' total expenditure and local governments' expenditure in health sector have increased with the increase in property damage from natural disasters. In addition, federal governments' total expenditure and federal governments' expenditure for disability have increased with the increase in disaster fatalities and disaster losses. Such economic burdens might hinder other development projects taken by governments. However, the disaster losses do not have any significant impact on earnings in all industries and gross income of internal revenue service. In fact, local government revenue increases with property damage. It implies that the industries are well-prepared and recover in an effective way from a natural disaster. As the median household income and per capita income increase with the loss from natural disasters, it is consistent with the increase in government revenues.

The counties where more people of all ages are living below the poverty line have higher fatalities from natural disasters. The property damages are also higher where more people living in poverty. As poor people are mostly living in vulnerable areas and are less likely to evacuate in a timely manner, they are more likely to die during disaster. This finding is consistent with the existing literature. The counties where median household incomes are higher, the property losses are lower. Moreover, where the homeownership rates are higher, fatalities and injuries from natural disasters are lower. If we consider homeownership as a proxy for wealth, poverty results in higher losses from natural disasters. The places where total housing units are higher, the property damages are also higher. As urban areas have more housing units compared to rural areas, it is predictable that urban areas will face more property damages in future disasters. In Alabama, counties where more Asian, children, elderly people, and poor people are living, the social vulnerability index is also higher for those counties.

CHAPTER 5

CONCLUSION AND DISCUSSIONS

5.1 Introduction

Natural disasters are a common occurrence throughout the United States, including the Gulf Coast region where the impacts are more frequent and severe. The Gulf Coast states regularly experience natural disasters of geological and hydro-meteorological origins due to their geographic location and geophysical characteristics. These natural disasters have a considerable impact on the lives and property of the people of the region. Between 1980 and 2010 the total direct cost of property damages with disaster events in the Gulf Coast states was estimated at 158.97 billion dollars, and the total cost of crop damages with disaster events was estimated at 20.31 billion dollars. The total number of deaths was estimated at 4,047 and the total number of injuries was 38,379. These statistics reflect only the events reported to the Spatial Hazard Events and Losses Database for the United States (SHELDUS). The highest contributor to total costs reported was from hurricanes, tropical storms, and coastal hazards, reflecting their dominance in terms of frequency and severity.

Until recently, researchers and practitioners have discounted the importance of vulnerability assessment and risk analysis. Yet, disasters affect disproportionately the poorest segments of society, as this study shows. Indeed, poverty reduction and improvement of the living conditions of socially disadvantaged populations are the most underrated mitigation actions, when compared to structural mitigations. Structural mitigations cannot solely resolve impacts of natural disasters. In fact, structural mitigation strategies frequently aggravate disaster situations. Natural disasters are the combined outcome of human activities and natural events; thus, we have no choice but to incorporate social dimensions of disasters in long-term mitigation strategies.

5.2 Discussion of results

This study conducted a county level empirical analysis of the relationship between disasters and poverty conditions, applying a data set from 1980 to 2010. The regression analyses of the counties of Alabama, Florida, Louisiana, Mississippi, and Texas reveal that the number of people living in poverty has a significant positive association with disaster fatalities, which unequivocally demonstrates that poverty conditions result in higher losses in a natural disaster. People with low income, particularly those living below the poverty line, often reside in hazardous areas, which makes them more vulnerable to natural disasters. The poor have less financial assets to respond, recover, and rehabilitate from a catastrophe. Consequently, disasters increase poverty by adding stress to existing conditions.

Table 21: Summary of Results

Dependent Variables	Fatalities	Injuries	Property damages	Crop damages
Poverty	✓	×	✓	✓
Income	✓	×	×	✓
Unemployment rates	×	✓	×	×
Employments	✓	×	×	×
Local government expenditure	✓	✓	×	×
Local government revenues	✓	✓	×	×
Federal government expenditure	✓	×	✓	✓
IRS gross income	✓	✓	✓	✓
Earning in all industries	✓	×	✓	✓
Population growth	×	×	×	✓

✓indicates variables that are significant and × sign indicates variables that are not significant

Table 1 illustrates that fatalities are the most significant variable of disaster impact. Fatalities significantly affect poverty, income, employments, local government expenditures and revenues, federal government expenditures, IRS income, and earnings of all industries. Injuries significantly affect unemployment and local government finances. Crop damages significantly affect income, poverty, federal government finances, and earnings of all industries. Property and crop damages also have significant impacts on the economic sector, mainly on federal government expenditure and IRS income. The federal government has to spend more for its insurance coverage. Property damage has a significant impact on poverty.

The per capita personal income has increased from 1980 to 2010 in the Gulf Coast region. However, the population living below the poverty level has also increased substantially in the same period. It is evident

from the study that disaster can induce poverty, especially among those living near the poverty line. For the Gulf Coast region, although the fatalities, injuries, property and crop damages from natural disasters do not show a clear upward trend, the most impacts from natural disasters have occurred in the first decade of the twenty-first century. Hurricanes Frances (2004), Charley (2004), Dennis (2005), Katrina (2005), and Rita (2005) are responsible for such damages from natural disasters in the region.

The unemployment rate decreases and private nonfarm employment increases when disaster losses increase in the Gulf Coast states. Property damages create many jobs during the rehabilitation and reconstruction period. Unemployment rates decrease and per capita income increases with the increase in disaster losses in the region. These results are consistent with the existing literature that natural disasters have no long-term impact on employment (Mehregan et al., 2012; Olson, 2011; Xiao, 2011). Nevertheless, the number of people living below the poverty line increases, which implies the creation of low-wage jobs. People employed in low-wage jobs, such as laborers in construction industries, often continue to live below the poverty line. Thus, the increase in employment is not the sole determinant of the betterment in poverty conditions.

The data suggests an increase in the wealth gap across the region. The regression analysis for the Gulf Coast states reveals that the number of people living below the poverty line is significantly influenced by fatalities, property damages, and crop damages from natural disaster. The regression analyses for Alabama, Florida, Louisiana, Mississippi, and Texas reveal that the number of people living below poverty line significantly relates to the fatalities and crop damages from natural disasters. The regression analyses have revealed that a higher number of fatalities and injuries from natural disasters result in a higher number of people living below the poverty line. Consequently, one can conclude that natural disasters exacerbate poverty conditions. Natural disaster losses are positively associated with per capita income and median household income. Poverty rates, per capita income, and median household income increase in disaster losses; this suggests that natural disaster is a factor in increased income inequality. It is evident from existing literature that affluent people and businesses profit from the reconstruction efforts after a disaster, whereas marginalized people living near the poverty line often fall below the poverty line. These results are consistent with current discourse regarding the political economy of natural disaster.

One might think that disasters result in migration and a decline in population. However, data shows that losses from natural disasters do not impact the natural population growth in Alabama, Florida, Louisiana, Mississippi, and Texas. The correlation analyses and regression analyses reveal that natural disasters do not have any significant association with people's locational choices at the county level. People might not consider natural disaster as a factor in their locational choices, due to the advancement in forecasting and warning systems. Scientific innovations create the sense that there is ample time for evacuation. Many of the vulnerable sites are also exotic places for tourists and offer service sector employment, which attracts and maintains the population. Federal and private insurance coverage in disaster prone areas have also played a role in consistent population growth in the Gulf Coast states.

The impacts of natural disasters are not merely a matter of social and humanitarian importance; they are of economic importance too. In conjunction with socioeconomic conditions at the household level, the cumulative effects of natural disasters are reflected across sectors and through government finances. At local, state, and federal levels, the impacts of natural disasters are not merely social and humanitarian issues. They have significant macroeconomic and fiscal impacts at all levels of government. In general, disasters result in higher government expenditures, reallocation of pledged financial resources to meet the costs of disaster relief, repair and rehabilitation of public property. Both local and federal government expenditures on counties increase as disaster fatalities and property damages increase. Moreover, the federal government spends more on insurance, disability, and the health sector when disaster impacts increase. The financial encumbrances on the local and federal governments due to natural disaster, hinders government spending on more constructive projects. However, there is little quantitative empirical evidence showing the long-term impact of disasters on economic development prospects.

Natural disasters have also created a significant financial burden on local and federal governments in the Gulf Coast region. Local governments' total expenditures, and expenditures in the health sector, have increased when property damage from natural disasters increased in Alabama. Local governments' total expenditures increased when fatalities, injuries, and crop damages increased in Alabama and Florida. Local

governments' expenditures in the health sector increased when disaster fatalities increased in Florida. In addition, the federal government's total expenditures have increased with the increase in disaster fatalities and disaster losses. Federal government insurance increased with the increase in fatalities, property damage, and crop damages in Florida. Both local governments' general expenditures, and the federal government's total expenditures, increased with the increase in property damages from natural disasters. Local governments' general expenditures in health and the federal government's total expenditures, federal government insurance, and federal government's expenditures for disability have increased with the increase in property damages from natural disasters. Such economic burdens hinder other development projects taken by governments. However, the disaster losses do not have any significant impact on earnings in all industries or on the gross income of the Internal Revenue Service (IRS). In fact, local government revenue increases with the increase in property damage. This implies that the industries are prepared to recover in an effective way from a natural disaster. An increase in median household income, per capita income, and employment after natural disasters is consistent with the increase in government revenues.

One might expect that disasters result in a decline in government revenue because of the reduced level of economic activity immediately after a disaster. However, disaster impacts do not reduce government revenues, earnings of all industries, or median household incomes of counties of the Gulf Coast states. This resiliency is due to new jobs in the reconstruction sector. In addition, disaster fatalities and property damage had no negative impacts on the natural population growth of the counties of Gulf Coast States from 1980 to 2010.

A Higher level of poverty has resulted in higher losses from disaster in Alabama, Florida, Louisiana, Mississippi, and Texas. Disaster fatalities and property damage have increased with more people living below poverty levels in the counties of Alabama, Florida, Louisiana, Mississippi, and Texas. The counties have more people of all ages in poverty, had more fatalities, injuries, property losses, and crop damages in Florida. The property damages are also higher where more people live in poverty in Alabama. In Mississippi, counties with a higher number of people living below poverty level, and a higher unemployment rate, have more

fatalities and property damages from natural disasters. Poor people are more likely to live in hazardous areas, and are less likely to evacuate in a timely manner. Consequently, they are more likely to die during disasters. These findings are consistent with the existing literature.

Demographic variations are significantly associated with disaster losses. Gulf Coast states, where median per capita incomes are higher, the disaster losses are lower. In Texas, the counties with higher median household income have higher property damages, while counties with more Social Security and Medicare recipients sustain higher fatalities from disaster. The counties with highest numbers of Social Security recipients have higher fatalities, property damages, and crop damages from natural disasters.

Higher homeownership rates correlate with fewer fatalities and economic losses from natural disaster. Homeownership is a proxy for wealth. Non-homeowners are more likely to be poor, and suffer from higher fatalities. Where total housing units are higher, property damages are also higher. As one might expect, crowded urban areas face more property damages than rural areas.

Educational attainment is a significant factor in the effect of disaster. For example, in Louisiana, the counties with more educational attainment are less vulnerable from natural disasters. This may be because educated persons are likely to respond to warnings and information during the time of a natural disaster. This supports the existing literature that educational accomplishments can lower the disaster risk. Conversely, persons on welfare and single mother households have a lower educational attainment and a higher number of disaster fatalities.

The regression analysis reveals approximately 70% variation in social vulnerability correlating with such factors as per capita personal income, female populations, Latinos, Asians, American Indians, Black populations, children and elderly populations, foreign born populations, net international migrations, social security benefit recipients, people of all ages in poverty, median gross rent, and federal government insurance in the Gulf Coast states. Data shows the vulnerability to natural disaster is increased in populations with differential demographic groups. In all five Gulf Coast states, people over age 65 are more vulnerable

to natural disaster. The number of Black populations is positively associated with vulnerability in Louisiana; the number of Asian populations is positively associated with vulnerability in Alabama and Florida; the number of female populations is positively associated with vulnerability in Florida, Mississippi, and Texas; the number of children under the age of five years correlates with more vulnerability in Alabama, Louisiana, and Texas; and, the number of poor is positively associated with social vulnerability in Alabama, Mississippi, and Texas. These significant correlations confirm that socially disadvantaged population groups in the Gulf Coast states are more vulnerable to natural disasters.

Poverty is rampant and disasters are common throughout the Gulf Coast region. It is predicted that natural disasters will increase in terms of frequency and extremity. Poverty conditions and disaster impacts are inextricably interconnected. Poverty increases the vulnerability of the people to natural disasters, and disasters exacerbate poverty. It is evident from this study that the relationship between poverty and disaster is intertwined with a complex set of social, economic, demographic, environmental, and political factors. The strong empirical mutual interconnectedness of natural disasters and poverty conditions requires a multifaceted approach focused on reducing poverty and decreasing the vulnerability of people to enhance resiliency.

5.3 Relationship of results to previous findings

Considerable anecdotal evidence, as well as qualitative research findings, has confirmed the link between disaster risk and poverty. It is widely acknowledged that the poor often live in poorly constructed houses in perilous places; thus becoming more vulnerable to disasters. It is difficult for the poor to mitigate the disaster risk by relocating to less hazardous places and purchasing insurance. The capacity of the poor to respond to and recover from natural disasters is constrained by their limited income and inadequate financial savings. The results of this study are consistent with numerous qualitative studies (E. Ali & Talukder, 2010; Billon & Waizenegger, 2007; Boulle et al., 1997; Bouwer & Aerts, 2006; Doherty & Clayton, 2011; Kim, 2012; Norris et al., 2008; T. O'Dempsey, 2009; Sanderson, 2000) that confirm poor people are more exposed to natural disasters and extreme weather events than the non-poor. Previous studies have shown higher mortality rates among poorer and disadvantaged segments of the society (Campanella, 2006; Kaur, 2006;

Margaret M. McMahon, 2007; Pradhan et al., 2007; O. Rubin & Rossing, 2012; Zahran et al., 2008). It is evident, from this study, that poorer communities in the Gulf Coast states of Alabama, Florida, Louisiana, Mississippi, and Texas are living with high disaster risks and greater disadvantages than the non-poor.

The results of this study reveal that female populations are more vulnerable to natural disasters in Florida, Mississippi, and Texas which is consistent with the previous findings (Cupples, 2007; Enarson, 1998; Ginige et al., 2009; Horton, 2012; Ikeda, 2009; Oxfam, 2010; Rao, 2006; West & Orr, 2007). A number of studies focused on the vulnerability of children, in various disaster situations, because of their physiological, psychosocial, and cognitive differences from adults (Belfer, 2006; Brandenburg et al., 2007; Guha-Sapir et al., 2007; Javaid et al., 2011; Murray & Monteiro, 2012). The study showed that disaster vulnerability of children in Alabama and Texas are consistent with previous findings, in which a higher number of one to five year old children led to increased social vulnerability. Counties with a higher number of elderly people with higher social vulnerability are in Alabama, Florida, and Texas, which is consistent with previous findings (Basher, 2008; Susan L. Cutter et al., 2003; Degg & Chester, 2005; Langan & Palmer, 2012; Loke et al., 2012; Pekovic et al., 2007; Steckley & Doberstein, 2011; Torgusen & Kosberg, 2006; World Health Organization, 2008).

A number of studies have been conducted on disaster and disabilities (Clear, 2007; Guha-Sapir et al., 2007; Tatsuki, 2012; Wisner & Luce, 1993). This study reveals that disaster damage causes more federal expenditures for disabilities in Alabama, Florida, Louisiana, and Texas. Numerous studies, especially after Hurricane Katrina, have shown that racial and ethnic communities in the United States are more vulnerable to natural disasters (Bullard, 2008; Carp, 2007; Cline et al., 2010; M. L. K. Edwards, 1998; Elliott & Pais, 2006; Forgette et al., 2008; Fothergill et al., 1999; Hobfoll, 2012; Kaiser et al., 2008; Uttley, 2010; Wiener, 2007; Wisner & Luce, 1993; Wyche et al., 2011). The result of this study showed that Black populations are more socially vulnerable to natural disasters in Florida, Mississippi, and Texas. In addition, Latino populations were more socially vulnerable in the counties of Texas.

Several studies investigated the risk for outbreaks of contagious diseases in the chaotic circumstances following natural disasters. Contagious diseases derived from population displacement, availability of safe water and sanitation facilities, degree of crowding, underlying health status of the population, and availability of healthcare services (T. O'Dempsey, 2009; J. T. Watson et al., 2007; Wisitwong & McMillan, 2010). This study shows that impacts of natural disasters resulted in increased local government expenditures in health sectors in Alabama, Florida, Louisiana, and Texas. The counties with more educational attainment were less vulnerable to natural disasters in Louisiana, because educated persons are more likely to respond to the warnings and information during the time of a natural disaster. This data supports the existing literature that educational accomplishments can lower the disaster risk (Arnold, 2006; Fillmore et al., 2011; Norris et al., 2005; Nozawa et al., 2008; Pagan, 2010; Webbink, 2008). Consistent with previous studies by Sherrieb et al. (2010) and Zottarelli (2008), this study shows that, in all five Gulf Coast states where the homeownership rates are higher, fatalities and injuries from natural disasters are lower.

This study showed that natural disasters interrupt economic activity, as the expenditures of federal and governments have increased with impacts of natural disasters in the Gulf Coast region. Previous studies have illustrated that channeling of public and private sector resources hinder economic development (Asef, 2008; Bankoff, 1999; Chee-Kien & Pieris, 2011; Manuel-Navarrete et al., 2007; Posner, 2004). However, the increase of local government revenue and IRS gross income during times of disaster losses contradicts the findings of Kaur (2006) who predicted a reduction in revenues in disaster areas due to low yield and damages to infrastructure. Private nonfarm employments also increase with the increase of disaster damages, which is consistent with several studies that found total employment increases after a disaster (Mehregan et al., 2012; Olson, 2011; Xiao, 2011).

It is evident from this study and previous studies that federal and private insurance coverage in disaster prone areas have played a role in consistent population growth (Barthel & Neumayer, 2012; Grove, 2012; E. Mills, 2005; Zolfaghari, 2010). Natural disasters do not affect people's locational choices at the county level in the Gulf Coast states. The populations of the counties of the Gulf Coast region have increased as disaster damages have increased. People might not consider natural disaster as a factor for their locational

choices due to the scientific advancement in warning systems. Consequent to scientific innovations in forecasting and proper evacuation planning, people can afford time to evacuate. In addition, many perilous locations are also exotic tourist destinations and offer attractive service sector employments.

The regression analyses of Alabama, Florida, Mississippi, and Texas reveal that the number of people living below poverty level has increased with the increase of disaster damages. However, natural disaster losses are positively associated with per capita income and median household income. Poverty rates, per capita income, and median household income increased with the increase in disaster losses, which might indicate that natural disaster is a factor in increased income inequality in the Gulf Coast states. It is evident from previous literature that the well-off people and businesses profit from the reconstruction efforts in the aftermath of a disaster, whereas the marginalized people living near the poverty line fall below the poverty line (Baade et al., 2007; Colten, 2009; Pinter et al., 2006; Powell, 2007; Trethewey, 2008). The current results are consistent with existing discourse on the political economy of natural disaster, which proposes that the gap between the rich and the poor widens in the aftermath of a natural disaster (Anderson, 1994b; L. Lee, 2011; Mogull, 2007).

5.4 Relationship of results to theory

The findings of the quantitative analyses of this study are consistent with the structural explanation of poverty that shows how the role of socio-economic conditions exacerbates poverty. In existing literature, a structural view commonly describes poverty conditions in pre- and post-disaster situations. The theoretical studies have already proposed that structural determinants, such as government policy, poor educational system, discrimination, and economic systems cause poverty. It is evident from the literature that proper policy interventions in all phases of disaster can ameliorate the adverse impacts of disasters. The environmental justice paradigm also suggests that an unjust society is unable to address the problems of disadvantaged communities that transform a natural disaster into a social disaster. The issues surrounding environmental justice imply that commitments by governments and politicians need to be more accountable to the most vulnerable citizens.

The findings are also consistent with the hazard-based model and structural vulnerability paradigms. The hazard-based model views disaster in terms of society and community vulnerability and the identification of resources that promote or hinder patterns of social resiliency. The structural-vulnerability paradigm incorporates concerns of social structural inequalities that describe class, race, ethnicity, gender, and poverty as organizing concepts for understanding and predicting disaster effects and subsequent differential patterns of collective recovery. It is evident from this study that socially disadvantaged populations and communities are more vulnerable in pre-disaster situations, and suffer more fatalities and damages during a natural disaster. The results are also consistent with the sustainable hazard mitigation concepts. According to this concept, offering human rights, creating just and sustainable environments that build resilience, revering human rights, and creating economic, social, and cultural wellbeing will lead to poverty reduction. As a result, the adverse impacts of disasters can be reduced.

The analyses of economic determinants are consistent with the development paradigm of disaster. The results indicate that natural disasters pose a tremendous financial burden on federal and local governments. Thus, socio-economic development might be hindered by rising effects of extreme weather events. The development paradigm of natural disaster suggests that disaster damages are dependent on human development and built-environment. This study also confirms that higher population densities result in more fatalities and damages from natural disasters.

As the poverty rates, per capita income, and median household income have increased with the increase in disaster losses, this study indicates that the impacts from natural disaster create increased income inequality. As is evident from existing literature of political economy and disaster capitalism, affluent people and big business profit from reconstruction efforts in the aftermath of a disaster, whereas the marginalized people living near poverty will fall below the poverty line. This study confirms the widening gap between the rich and the poor in the aftermath of a disaster.

5.5 Implications for Policy and Practice

Analyses of the relationship between disaster and poverty in the Gulf Coast states suggest that a multi-faceted approach to disaster risk mitigation and poverty reduction is essential. The assessment of disaster and poverty conditions in the Gulf Coast region suggests that reducing the level of poverty, and improving socio-economic conditions, is important for mitigating disaster risks. Local governments need to reduce the vulnerabilities of socially disadvantaged populations, particularly poor households, in order to improve the socio-economic wellbeing of their communities. The reduction of disaster vulnerability and the improvement of people's coping capacity with natural disasters are equally important in developing and implementing both economic development and disaster risk management plans.

It is predicted that the frequency and severity of natural disasters will increase in the future. Since socio-economic conditions are associated with disaster impacts, pre-disaster interventions to assist the socially disadvantaged populations can reduce human and economic losses. These interventions might effectively reduce the need for post-disaster humanitarian aid. The special needs of marginalized populations must be incorporated in disaster management strategy and poverty reduction programs. Such proactive policy interventions and disaster risk mitigation strategies can significantly lower the vulnerability levels, including loss of life and human capital. Poverty reduction strategies ignoring the importance of disaster risk reduction are counter-productive and can increase the disaster vulnerability of the poor and consequently improve overall economic development.

Disaster management depends greatly upon the local socio-economic conditions within the affected region. Vulnerability to disasters is related to poverty; therefore, investing in poverty reduction should be considered as an element of disaster recovery. The impact of natural disaster in urban areas where there is rampant poverty and marginalization is often worse than in non-urban environments. Proactive and preventive urban planning can help to avoid post-disaster turmoil and forced eviction from these communities. Early intervention for poverty reduction, helping people to escape the poverty trap, and creating provision for human rights, dignity, and opportunities to fully participate in society are important for the

avoidance of disruptions created by natural disasters. In conjunction with policy interventions, it is also important to empower poorer people so that they can influence policies and hold accountable the policy-makers. The best way to reduce disaster vulnerability is to improve the socioeconomic conditions of the most disadvantaged population groups. A long-range vision and significant commitment of federal, state, and local governments in terms of organizational practice, constructing shared vision about political involvement, inclusion, and equality might turn disaster into a unique opportunity for rebuilding communities. In order to reduce the risks from natural disasters The Gulf Coast states must implement strategies that reflect a pro-poor development approach that targets socially disadvantaged communities living in hazard prone areas.

As outcomes of disasters are linked to socioeconomic, political, and cultural patterns of society, concerns about gender, age, disability, and minorities should be fully addressed in the planning and policy making process. Special provisions for socially disadvantaged groups must be incorporated in the procedures, plans, policies, and actions designed for disaster management. The vulnerabilities faced by disadvantaged groups in catastrophic situations can be reduced by an integrated and interlinked multi-disciplinary approach to disaster management. Disaster preparedness and response would be effective for socially disadvantaged groups if a more holistic and flexible planning and response framework is developed based on differential functional needs, such as communication, medical needs, supervision, leadership, service deliveries, training, and transportation for diverse population groups. Existing emergency management policies could be reviewed with respect to meeting needs of vulnerable populations in a consultative manner with researchers, first responders, and care-givers so that the risk of the disadvantaged population could be minimized during the time of a natural disaster. Strengthening the risk assessment and management skills of planners is also important for disaster risk reduction.

The supply of well-constructed affordable housing can diminish the vulnerability of the low-income populations by reducing the propensity of the poor to live on hazardous sites. The improvement of housing conditions by well-designed development strategies can significantly reduce vulnerabilities to disaster. Along with designation of evacuation routes and shelters, it is also important to support programs for building new housing and retrofitting the old ones. In addition, a community-based disaster management program needs

to be implemented ensuring that residents from the poorest communities can build a social network for disaster preparedness with other residents, local employers, and non-profit organizations. Many counties of the Gulf Coast states have experienced multiple hazards that pose a danger to the constructed environment; therefore, policy interventions should address hazards in an integrated manner to achieve desired preparedness in ways that are consistent with people's expectations and general societal objectives.

It is important to find ways in which the disadvantaged groups can be brought into the disaster planning process. One way is to bring them together to discuss their experiences and give them an opportunity to debrief the barriers to evacuation. A participatory approach could inform of deterrents to evacuation and promote preparedness for disaster, afford transportation, offer shelter for humans and pets, address health necessities, and plan the logistics for evacuation. More effective planning would save tens of billions of dollars as well as thousands of lives in future disasters. Planners can improve disaster management strategies by recognizing the socioeconomic dimensions of disaster; this would allow for differentiation of effects of interventions among different population subgroups. Engaging members from different population subgroups in a participatory planning process is an important way to incorporate ideas from all segments of society.

In post-disaster situations, to alleviate human suffering, humanitarian assistance should be provided based on needs without discriminating against class, race, age, gender, or other qualifiers. Assistance should recognize that not all socially disadvantaged groups will suffer identical difficulties in disasters. Nevertheless, since poor populations suffer most in disasters, recovery programs need to be actively pro-poor. Volunteers are also important in disaster response and recovery in the extremely poor communities. An improved disaster monitoring and strengthened warning system, together with the quick and well-coordinated response to disasters, will help reduce human suffering and minimize the socio-economic costs.

The economic future of the Gulf Coast region depends on political commitments to an anticipatory approach to disaster recovery policy. A better coordination among multi-level governments is essential for disaster risk reduction. During the time of a disaster, a collaborative effort among government agencies, local

non-profit organizations, and the residents can ensure context-sensitive responses to vulnerable people. The Gulf Coast states and jurisdictions of Alabama, Florida, Louisiana, Mississippi, and Texas might not establish modern social systems encompassing a high level of human development on their own; therefore, the federal government needs to materialize the essential political supports. Governments need to integrate disaster risk considerations in development planning and budgeting processes at national, state, and local levels. Differing results in counties in different states indicate the importance of diverse and local level policy interventions based on geographic and demographic characteristics. Numerous socio-economic and political factors need to be considered, and criteria must be developed for formulating equitable disaster policy. Lessons learned from one disaster can help to improve the coordination in later disasters. To prepare for disasters and mitigate their impacts, governments should incorporate quantitative knowledge and the implementation of national and integrated risk-management strategies.

5.6 Implications for Further Research

It is important to explore further the complex interactions of disaster and risk with gender, class, age, disability, and other axes of inequality by applying both qualitative and quantitative research techniques. Examining the group behaviors and inter-community comparisons of socially disadvantaged groups would be a good research agenda, as would further research on social capital and its interaction with vulnerability and resiliency of community. Development of theoretical models, based on sociological and political-economy theories, can help to identify how disaster and vulnerabilities are associated in the intersection of inequalities and population growth, composition and spatial distribution, Qualitative studies should include perspectives on preparedness, relief, recovery, and mitigation at household levels, which would lead to a better understanding of the lives of different socially disadvantaged groups, during and after disaster, in the context of organizational practices and macro-economic social forces. Reviewing and assessing the scope and depth of different geographic information systems (GISs) and databases, available in the Gulf Coast states, could also support disaster research by identifying scope of improvements.

Continuous research on future disasters must be conducted to improve social theory regarding disaster so that disaster management scholarship does not stagnate. The construction of spatial models of vulnerable populations and housing in the Gulf Coast region can lead to better preparedness for disaster, ranging from urban planning and zoning, to mitigation and financial protection. It would also be helpful to conduct a cross-country study at a larger scale in the future. As industrial disasters increase along with natural disasters in the current decade, which is evident from the recent fertilizer company explosion in Texas (April 17, 2013) and the chemical plant explosion in Louisiana (June 13, 2013), the differential impacts of industrial disaster on socially disadvantaged groups could be added to the research agenda.

5.7 Summary and Conclusions

This study did show the existence of a complex two way relationship between natural disasters and poverty conditions in the Gulf Coast states. The analyses confirm that natural disasters result in increased poverty in the counties of the Gulf coast region and hinder economic development. Conversely, this study confirms that increases in poverty make disaster outcomes more severe. However, a complex set of variables influences the depth and breadth of these relationships. The study of the Gulf Coast states from 1980 to 2010 revealed that natural disasters exacerbate poverty situations, and poverty results in higher losses in natural disasters. The study of the counties of Alabama, Florida, Louisiana, Mississippi, and Texas reveals that the people living in poverty have a significant positive association with disaster fatalities and property damage, which demonstrates that natural disasters are likely to increase poverty. Moreover, the counties that have more socially disadvantaged groups are more vulnerable to disaster. The decrease of the vulnerable populations will certainly reduce the disaster risk in the future. Alabama, Florida, Mississippi, Louisiana, and Texas are among the most hazard-prone states in terms of events, casualties, and economic losses. The lessons from the trends of disaster losses in the Gulf Coast region need to be incorporated in developing more sustainable decisions for reducing vulnerability and mitigating disasters throughout the country. Disaster risk reduction strategies should incorporate questions of poverty, gender, ethnicity, age, and other socially disadvantaged populations at risk from environmental catastrophes.

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APPENDIX A

Table A.1: Descriptive Statistics for Alabama

	N	Minimum	Maximum	Mean	Std. Deviation
Year	2,077	1980	2010	1995	8.946
Social Vulnerability Index	134	-6.609	11.428	0.156	2.819
Place of birth, foreign-born (%)	134	0.00	7.90	1.668	1.445
Injuries	2,076	0	463	1.78	13.215
Fatalities	2,075	0	32	.28	1.318
Property damage	2,077	0.00	1,001,526,000	3,658,802	30,796,978
Crop damage	2,069	0.00	22,500,000	280,818	1,253,897
Social security: disabled workers - benefit recipients	1,407	175	27,780	1,964.88	2,730.058
Social security - benefit recipients	1,541	1,875	131,660	12,289	17,691
Total Females (%)	737	44.50	54.70	51.4668	1.555
Resident population: Hispanic or Latino Origin (%)	737	0.50	15.40	2.252	2.119
Resident population: Asian alone (%)	737	0.00	2.60	0.4358	0.45590
Resident population: American Indian and Alaska Native alone (%)	737	0.10	8.00	0.6145	1.120
Resident population: Black alone (%)	737	0.40	84.80	28.367	21.825
Population below poverty level	201	1,750	107,081	11,079.27	15,493.673
Components of change - net domestic migration	670	-4,792	5,262	127.93	988.576
Components of change - net international migration	670	-364	1,305	75.73	171.091
Resident population	2,077	8,829	671,324	63,836.71	96,966.782
Rural population	201	6,165	78,753	25,575.16	15,458.49
Urban population	201	0	600,461	36,024.71	85,065.45
Per capita personal income ($)	1,876	211.00	44,414.00	15,442.4216	6,822.25062
Local government finances - direct general expenditures for health (TH$)	268	0.00	88,529.00	2,751.37	9367.78
Local government finances - direct general expenditures (TH$)	335	5,710.00	2,646,074	106,035.43	223,780.22
Local government finances - general revenue, total FY (TH$)	335	5,599.00	2,126,716	105,841.65	220,178.06
	268	1,326	148,229	12,153.09	20,219.61

	N	Minimum	Maximum	Mean	Std. Deviation
	335	72,348.00	15,982,101	1,193,949	2,115,138
Related children age 5 to 17 in families in poverty (%)	938	6.90	52.80	24.347	7.136
People under age 18 in poverty (%)	938	7.70	409.30	26.6380	14.47
Households with income of $150,000 or more	201	0	17,688	621.90	1,784.09
Households with income of $125,000 to $149,999	201	0	9474	439.02	1081.602
Households with income of $100,000 to $124,999	201	2	16851	912.15	2004.149
Median household income ($)	1005	11,990	71,785	31,256.91	7,794.994
Housing units by units in structure - mobile home or trailer	201	855	16151	4217.50	2953.098
Median gross rent of specified renter-occupied housing units paying cash rent	268	109.00	807.00	329.5149	154.32830
Median value of specified owner-occupied housing units ($)	268	18,600	188,000	59,427.61	29,974.57
Hospital insurance and/or supplemental medical insurance (Medicare) - disabled persons enrolled	603	382	25,027	2,267.29	3,036.616
Hospital insurance and/or supplemental medical insurance (Medicare) - aged persons enrolled	670	1,203	92,636	8,428.85	12,399.56
Hospital insurance and/or supplemental medical insurance (Medicare) - total persons enrolled	670	1,669	111,509	10,645.84	15,313.11
Federal Government insurance	1,876	.00	5445108	60506.09	340975.53
Federal Government expenditure - direct payments for individuals, retirement and disability	1,876	10,427.00	2,528,885	142,998.82	241,144.80
Federal Government expenditure	1,876	16,030	9,978,211	397,519.96	900,851.61
Public School Enrollment	1,473	1,345	113,289	10,941.01	15,963.19
Educational attainment - persons 25 years and over - percent high school graduate or higher	268	37.60	91.50	63.70	12.30
Earnings in all industries (TH$)	536	67,920	25,384,959	1,363,555.45	3,132,481.498
Civilian labor force unemployment rate	1,407	1.50	23.50	7.2149	3.26580
Civilian labor force unemployment	1,407	164	29242	1778.20	2548.916
Civilian labor force	1,407	3,095	338,670	31,264.42	48,177.269
Private nonfarm employment- other services (except public administration)	536	0	22,034	1,241.02	2,885.988
Private nonfarm employment-	804	0	27,432	2,094.88	3,999.134

	N	Minimum	Maximum	Mean	Std. Deviation
accommodation and food services					
Private nonfarm employment - arts, entertainment and recreation	536	0	3,997	172.82	464.748
Private nonfarm employment - health care and social assistance	804	0	53,386	3,282.33	7,230.975
Private nonfarm employment - educational services	536	0	7,026	286.33	942.662
Priv. nonfarm employment - admin., support, waste mgt. and remediation services	536	0	27,190	1,448.20	3,804.585
Private nonfarm employment - management of companies and enterprises	536	0	765,009	7,317.19	54,975.60
Private nonfarm employment - professional, scientific, and technical services	804	0	33,214	1,261.91	4,055.07
Private nonfarm employment - real estate, rental and leasing	536	0	8,151	358.47	982.91
Private nonfarm establishments - finance and insurance	804	0	27,301	583.05	2,362.81
Private nonfarm employment - information	536	0	16,636	567.89	1,816.74
Private nonfarm employment - transportation and warehousing	536	0	10,463	783.01	1,532.121
Private nonfarm employment - retail trade	804	0	4,4302	3,483.24	6,368.768
Private nonfarm employment - wholesale trade	804	.00	25,944	1,138.58	2,951.41
Private nonfarm employment -manufacturing	804	.00	38,118	4,321.89	5,541.59
Private nonfarm employment - construction	804	0	28,362	1,543.19	3,722.705
Private nonfarm employment - utilities	536	0	1,292	38.87	135.362
Private nonfarm employment - mining	536	0	2,016	76.30	294.71
Private nonfarm employment- forestry, fishing, hunting, and agriculture support	536	0	471	87.08	95.51
Private nonfarm employment	2010	907	362,120	21,120.15	45,206.92
Cropland - total (acres) (adjusted)	201	8,465	191,138	56,272.39	36,972.71
Farm operators by principal occupation - farming (adjusted)	201	67.00	1,356	303.31	211.11
Owner-occupied housing units - percent of total occupied housing units	134	59.80	88.10	74.49	6.21
Total housing units	201	4,162	300,552	28,885.29	42,709.06
Female householders, no husband present	66	499	46,101	4,017.83	6,840.37
People of all ages in poverty (%)	938	5.80	41.30	18.81	5.897

	N	Minimum	Maximum	Mean	Std. Deviation
People of all ages in poverty (abs)	938	1520	107,081	10,627.61	14,932.21
Median Age (Complete Count)	268	23.40	44.20	34.60	4.376
Resident population 65 years and over (%)	730	8.10	18.80	14.39	2.093
Resident population under 5 years (%)	737	4.60	8.50	6.46	0.642
Households with income of $100,000 or more	201	13.00	4,4013	1,973.07	4,824.41

Table A.2: Correlation Table for Alabama

		Fatalities	Injuries	Property damage	Crop damage
Social Vulnerability Index	Pearson Correlation	-0.102	-0.125	-0.084	-0.147*
	Sig. (2-tailed)	0.241	0.149	0.334	0.090
	N	134	134	134	134
Foreign-born populations (%)	Pearson Correlation	0.092	0.071	0.071	0.044
	Sig. (2-tailed)	0.293	0.414	0.413	0.613
	N	134	134	134	134
Social security: disabled workers - benefit recipients	Pearson Correlation	0.186***	0.151***	0.171***	-0.040
	Sig. (2-tailed)	0.000	0.000	0.000	0.130
	N	1,406	1,406	1,407	1,403
Social security - benefit recipients	Pearson Correlation	0.214***	0.187***	0.165***	0.000
	Sig. (2-tailed)	0.000	0.000	0.000	1.000
	N	1,540	1,540	1,541	1,537
Total Females (%)	Pearson Correlation	0.017	0.002	0.059	0.066*
	Sig. (2-tailed)	0.654	0.957	0.109	0.074
	N	737	737	737	736
Hispanic or Latino populations (%)	Pearson Correlation	0.002	0.061*	-0.045	-0.065*
	Sig. (2-tailed)	0.963	0.095	0.223	0.078
	N	737	737	737	736
Asian Populations (%)	Pearson Correlation	0.110***	0.121***	0.047	-0.035
	Sig. (2-tailed)	0.003	.001	0.204	0.337
	N	737	737	737	736
American Indian and Alaska Native populations (%)	Pearson Correlation	0.001	-.012	0.074*	0.060
	Sig. (2-tailed)	0.978	0.754	0.044	0.105
	N	737	737	737	736

		Fatalities	Injuries	Property damage	Crop damage
Black populations (%)	Pearson Correlation	-0.068*	-0.074**	0.033	0.068*
	Sig. (2-tailed)	0.065	0.044	0.365	0.064
	N	737	737	737	736
Population below poverty level	Pearson Correlation	0.129*	0.073	0.082	-0.041
	Sig. (2-tailed)	0.068	0.304	0.246	0.565
	N	201	201	201	201
Net domestic migration	Pearson Correlation	0.120***	0.010	-0.035	-.013
	Sig. (2-tailed)	0.002	0.806	0.372	0.740
	N	670	670	670	669
Net international migration	Pearson Correlation	0.126***	0.043	0.193***	-0.004
	Sig. (2-tailed)	0.001	0.267	0.000	0.920
	N	670	670	670	669
Resident population	Pearson Correlation	0.218***	0.137***	0.139***	0.007
	Sig. (2-tailed)	0.000	0.000	0.000	0.737
	N	2,075	2,076	2,077	2,069
Rural population	Pearson Correlation	0.080	0.211***	0.275***	0.087
	Sig. (2-tailed)	0.261	0.003	0.000	0.217
	N	201	201	201	201
Urban population	Pearson Correlation	0.152**	0.194***	0.299***	0.082
	Sig. (2-tailed)	0.031	0.006	0.000	0.249
	N	201	201	201	201
Per capita personal income ($)	Pearson Correlation	-0.013	0.045*	0.093***	0.048**
	Sig. (2-tailed)	0.579	0.050	0.000	0.040
	N	1,874	1,875	1,876	1,868
Local government's direct general expenditures for health (TH$)	Pearson Correlation	0.002	0.037	0.240***	0.108*
	Sig. (2-tailed)	0.976	0.552	0.000	0.078
	N	268	268	268	267
Local government's direct general expenditures (TH$)	Pearson Correlation	0.043	0.018	0.272***	0.047
	Sig. (2-tailed)	0.431	0.745	0.000	0.393
	N	335	335	335	334
Local government's general revenue, total (TH$)	Pearson Correlation	0.056	0.021	.264***	0.049
	Sig. (2-tailed)	0.308	0.708	0.000	0.369
	N	335	335	335	334
Female employments (abs)	Pearson Correlation	0.081	0.176***	0.194***	0.028
	Sig. (2-tailed)	0.188	0.004	0.001	0.645
	N	268	268	268	268

		Fatalities	Injuries	Property damage	Crop damage
Adjusted gross income- IRS (TH$)	Pearson Correlation	0.178***	0.123**	0.027	-0.030
	Sig. (2-tailed)	.001	0.024	0.628	0.589
	N	335	335	335	334
Related children age 5 to 17 in families in poverty (%)	Pearson Correlation	-0.080**	-0.10***	-0.013	0.068**
	Sig. (2-tailed)	0.014	0.002	0.686	0.036
	N	938	938	938	937
People under age 18 in poverty (%)	Pearson Correlation	-0.018	-0.045	-.0009	0.039
	Sig. (2-tailed)	0.582	0.170	0.775	0.238
	N	938	938	938	937
Households with income of $150,000 or more	Pearson Correlation	0.040	0.019	0.089	-0.026
	Sig. (2-tailed)	0.575	0.789	0.211	0.719
	N	201	201	201	201
Median household income ($)	Pearson Correlation	0.074**	0.044	0.026	-0.139***
	Sig. (2-tailed)	0.020	0.166	0.407	0.000
	N	1005	1005	1005	1004
Housing units by units in structure - mobile home or trailer	Pearson Correlation	0.183***	0.227***	0.206***	-0.048
	Sig. (2-tailed)	0.009	0.001	0.003	0.500
	N	201	201	201	201
Median gross rent of specified renter-occupied housing units paying cash rent	Pearson Correlation	-0.411***	0.079	0.236***	-0.216***
	Sig. (2-tailed)	0.000	0.196	0.000	0.000
	N	268	268	268	268
Median value of specified owner-occupied housing units ($)	Pearson Correlation	-0.369***	0.108*	0.242***	-0.198***
	Sig. (2-tailed)	.000	.078	.000	0.001
	N	268	268	268	268
Hospital insurance and/or supplemental medical insurance (Medicare) - disabled persons enrolled	Pearson Correlation	0.158***	0.099**	0.227***	-0.012
	Sig. (2-tailed)	0.000	0.015	0.000	0.769
	N	603	603	603	602
Hospital insurance and/or supplemental medical insurance (Medicare) - aged persons enrolled	Pearson Correlation	0.311***	0.272***	0.247***	0.009
	Sig. (2-tailed)	0.000	0.000	0.000	0.810
	N	670	670	670	669
Hospital insurance and/or supplemental medical insurance (Medicare) - total persons enrolled	Pearson Correlation	0.301***	0.263***	0.247***	0.007
	Sig. (2-tailed)	0.000	0.000	0.000	0.866
	N	670	670	670	669
Federal Government insurance	Pearson Correlation	0.196***	0.024	0.108***	-0.003
	Sig. (2-tailed)	0.000	0.297	0.000	0.906
	N	1,875	1,875	1,876	1,869

		Fatalities	Injuries	Property damage	Crop damage
Federal Government expenditure - direct payments for individuals, retirement and disability	Pearson Correlation	0.197***	0.119***	0.171***	-0.013
	Sig. (2-tailed)	0.000	0.000	0.000	0.588
	N	1,875	1,875	1,876	1,869
Federal Government expenditure	Pearson Correlation	0.153***	0.129***	0.117***	-0.015
	Sig. (2-tailed)	0.000	0.000	0.000	0.507
	N	1,875	1,875	1,876	1,869
Public School Enrollment	Pearson Correlation	0.226***	0.149***	0.157***	0.003
	Sig. (2-tailed)	0.000	0.000	0.000	0.894
	N	1,472	1,472	1,473	1,468
Educational attainment - persons 25 years and over - percent high school graduate or higher	Pearson Correlation	-0.398***	0.111*	0.226***	-0.180***
	Sig. (2-tailed)	0.000	0.071	0.000	0.003
	N	268	268	268	268
Earnings in all industries (TH$)	Pearson Correlation	0.102**	0.061	0.222***	-0.018
	Sig. (2-tailed)	0.018	0.157	0.000	0.670
	N	536	536	536	535
Civilian labor force unemployment rate	Pearson Correlation	-0.083***	-0.068**	-0.044*	0.034
	Sig. (2-tailed)	0.002	0.011	0.098	0.202
	N	1,406	1,406	1,407	1,403
Civilian labor force unemployment	Pearson Correlation	0.142***	0.128***	0.128***	0.010
	Sig. (2-tailed)	0.000	0.000	0.000	0.705
	N	1,406	1,406	1,407	1,403
Civilian labor force	Pearson Correlation	0.216***	0.196***	0.156***	0.001
	Sig. (2-tailed)	0.000	0.000	0.000	0.975
	N	1,406	1,406	1,407	1,403
Private nonfarm employment- other services (except public administration)	Pearson Correlation	0.118***	0.053	0.243***	-0.013
	Sig. (2-tailed)	0.006	0.218	0.000	0.759
	N	536	536	536	535
Employments in accommodation and food services	Pearson Correlation	0.265***	.215***	0.200***	0.004
	Sig. (2-tailed)	0.000	0.000	0.000	0.913
	N	804	804	804	803
Employments in arts, entertainment and recreation	Pearson Correlation	0.190***	0.059	0.038	0.011
	Sig. (2-tailed)	0.000	0.174	0.378	0.807
	N	536	536	536	535
Employments in health care and social assistance	Pearson Correlation	0.270***	0.245***	0.222***	0.007
	Sig. (2-tailed)	0.000	0.000	0.000	0.851
	N	804	804	804	803

		Fatalities	Injuries	Property damage	Crop damage
Employments in educational services	Pearson Correlation	.0178***	0.042	0.256***	0.040
	Sig. (2-tailed)	0.000	0.336	.000	.355
	N	536	536	536	535
Employments in admin., support, waste mgt. and remediation services	Pearson Correlation	0.114***	0.050	0.218***	-0.019
	Sig. (2-tailed)	0.008	0.250	0.000	0.656
	N	536	536	536	535
Employments in management of companies and enterprises	Pearson Correlation	0.020	-0.002	-0.015	-0.022
	Sig. (2-tailed)	0.636	.955	0.724	0.618
	N	536	536	536	535
Employments in professional, scientific, and technical services	Pearson Correlation	0.168***	.157***	0.141***	-0.001
	Sig. (2-tailed)	0.000	0.000	0.000	0.982
	N	804	804	804	803
Employments in real estate, rental and leasing	Pearson Correlation	0.131***	0.042	0.233***	-0.010
	Sig. (2-tailed)	0.002	0.330	0.000	0.824
	N	536	536	536	535
Private nonfarm establishments - finance and insurance	Pearson Correlation	0.059*	0.013	0.034	-0.009
	Sig. (2-tailed)	0.092	0.721	0.329	0.809
	N	804	804	804	803
Employments in information sector	Pearson Correlation	0.069	0.042	0.259**	-0.011
	Sig. (2-tailed)	0.110	0.331	0.000	0.801
	N	536	536	536	535
Employments in transportation and warehousing	Pearson Correlation	0.118***	0.032	0.212***	0.001
	Sig. (2-tailed)	0.006	0.467	0.000	0.986
	N	536	536	536	535
Employments in retail trade	Pearson Correlation	0.281***	0.234***	0.213***	0.007
	Sig. (2-tailed)	0.000	0.000	0.000	0.834
	N	804	804	804	803
Employments in wholesale trade	Pearson Correlation	0.277***	0.262***	0.218***	0.009
	Sig. (2-tailed)	0.000	0.000	0.000	0.804
	N	804	804	804	803
Employments in manufacturing	Pearson Correlation	0.247***	0.237***	0.142***	0.009
	Sig. (2-tailed)	0.000	0.000	0.000	0.794
	N	804	804	804	803
Employments in construction	Pearson Correlation	0.277***	0.234***	0.213***	0.007
	Sig. (2-tailed)	0.000	0.000	0.000	0.854
	N	804	804	804	803

		Fatalities	Injuries	Property damage	Crop damage
Employments in utilities	Pearson Correlation	0.072*	0.034	0.077*	0.118***
	Sig. (2-tailed)	0.098	0.439	0.075	0.006
	N	536	536	536	535
Employments in mining	Pearson Correlation	0.029	0.047	0.169***	-0.029
	Sig. (2-tailed)	0.502	0.277	0.000	0.497
	N	536	536	536	535
Employments in forestry, fishing, hunting, and agriculture support	Pearson Correlation	0.011	0.016	0.112***	0.206***
	Sig. (2-tailed)	0.804	0.714	0.010	0.000
	N	536	536	536	535
Private nonfarm employment	Pearson Correlation	0.216***	0.139***	0.157***	0.012
	Sig. (2-tailed)	0.000	0.000	0.000	0.595
	N	2008	2009	2010	2002
Cropland - total (acres) (adjusted)	Pearson Correlation	0.054	0.111	0.063	0.073
	Sig. (2-tailed)	0.443	0.117	0.378	0.300
	N	201	201	201	201
Farming occupation	Pearson Correlation	0.068	0.086	0.024	0.002
	Sig. (2-tailed)	0.338	0.225	0.735	0.978
	N	201	201	201	201
Owner-occupied housing units - percent of total occupied housing units	Pearson Correlation	-.184**	-0.184**	-0.129	-0.301***
	Sig. (2-tailed)	0.033	0.033	0.137	0.000
	N	134	134	134	134
Total housing units	Pearson Correlation	0.177**	0.227***	0.226***	0.326***
	Sig. (2-tailed)	0.012	0.001	0.001	0.000
	N	201	201	201	201
Female householders, no husband present	Pearson Correlation	0.062	-0.039	0.020	--
	Sig. (2-tailed)	0.619	0.754	0.876	0.000
	N	66	66	66	66
People of all ages in poverty (%)	Pearson Correlation	-0.080**	-0.09***	-0.016	0.059
	Sig. (2-tailed)	0.014	0.005	0.628	0.070
	N	938	938	938	937
People of all ages in poverty (abs)	Pearson Correlation	0.265***	0.190***	0.192***	0.013
	Sig. (2-tailed)	0.000	0.000	0.000	0.681
	N	938	938	938	937
Median Age (Complete Count)	Pearson Correlation	-0.484***	-0.031	0.028	-0.253***
	Sig. (2-tailed)	0.000	0.613	0.647	0.000
	N	268	268	268	268

		Fatalities	Injuries	Property damage	Crop damage
Resident population 65 years and over (%)	Pearson Correlation	0.008	-0.074**	0.009	0.032
	Sig. (2-tailed)	0.835	0.044	0.801	0.395
	N	730	730	730	729
Resident population under 5 years (%)	Pearson Correlation	-0.012	0.022	0.019	0.045
	Sig. (2-tailed)	0.751	0.553	0.603	0.225
	N	737	737	737	736
Households with income of $100,000 or more	Pearson Correlation	0.052	0.030	0.102	-0.030
	Sig. (2-tailed)	0.460	0.674	0.149	0.671
	N	201	201	201	201

Table A.3: Descriptive Statistics for Florida

	N	Minimum	Maximum	Mean	Std. Deviation
Year	2,077	1980	2010	1995	8.946
Social Vulnerability Index	134	-8.153	8.154	0.533	2.984
Population below poverty level	201	753	404,051	29,371.95	55,466.75
Employment status - in labor force, civilian labor force, employed, females (abs)	268	493	522,994	43,194.22	77,848.48
Cropland - total (acres) (adjusted)	201	0.00	529,888	51,124.59	71,771.01
Farm operators by principal occupation - farming (adjusted)	201	6.00	1,787	313.98	323.91
Federal Government insurance (TH$)	1,876	0.00	89,999,678	2,882,788.82	9,118,584.71
Federal Government expenditure - direct payments for individuals, retirement and disability (TH$)	1,876	3,658.00	5,419,382	530,076.29	806,449.51
Federal Government expenditure (TH$)	1,876	6,317.00	27,110,534	1,262,958.8	2,301,308.49
Hospital insurance and/or supplemental medical insurance (Medicare) - disabled persons enrolled	603	108	38,539	5,398.86	7,333.762
Hospital insurance and/or supplemental medical	670	566	305,941	38,032.92	56,861.861

	N	Minimum	Maximum	Mean	Std. Deviation
insurance (Medicare) - aged persons enrolled					
Hospital insurance and/or supplemental medical insurance (Medicare) - total persons enrolled	670	667	344,480	43,316.08	63,640.383
Female householders, no husband present	268	104.00	162,937.00	10,020.12	20,061.35
Total housing units	268	1,764	989,435	99,893.58	162,188.37
Owner-occupied housing units - percent of total occupied housing units	335	53.40	89.70	74.337	7.185
Median value of specified owner-occupied housing units ($)	268	19,600.00	570,500.00	9,1724.25	67,390.11
Median gross rent of specified renter-occupied housing units paying cash rent	268	129.00	1,190.00	481.67	246.86
Housing units by units in structure - mobile home or trailer	201	860	66,472	12,304.18	12,712.92
Components of change - net international migration	670	-1,792	40,585	1,270.54	4,495.388
Components of change - net domestic migration	670	-46,034	27,535	1,765.63	6,441.74
Place of birth, foreign-born (%)	134	1.00	50.90	8.49	7.99
Urban population	201	0	2,237,388	166,453.84	333,469.41
Rural population	201	964	120,572	25,917.44	21,387.88
Social security: disabled workers - benefit recipients	1,407	60	42,935	4,667.47	6,708.766
Social security - benefit recipients	1,541	668	371,465	46,401.77	67,554.01
Adjusted gross income- IRS (TH$)	335	59,317.00	46,953,234	5,903,352	9,324,437
Local government finances - direct general expenditures for health (TH$)	268	.00	99,271.00	5,133.89	10,738.94
Local government finances - direct general expenditures (TH$)	335	5,037.00	9,316,073.00	466,513.63	1,042,694.73
Local government finances - general revenue, total FY (TH$)	335	4,663.00	9,594,847	476,145.06	1,058,630.39
Total Females, Percent	737	34.10	52.60	48.70	3.695
Related children age 5 to 17 in families in poverty (%)	938	7.70	38.80	20.34	6.125
People under age 18 in poverty (%)	938	8.50	40.00	21.61	5.99
People of all ages in poverty (%)	938	6.70	30.30	15.16	4.88
People of all ages in poverty (abs)	938	978	480,990	323,61.63	60,705.30
Households with income of $150,000 or more	201	0	59,313	4,108.00	9,147.28
Households with income of $125,000 to $149,999	201	0	299,47	2,088.63	4,495.711
Households with income of $100,000 to $124,999	201	0	52,483	4,124.31	8,244.69

	N	Minimum	Maximum	Mean	Std. Deviation
Per capita personal income ($)	1,876	4,400.00	63,276.00	18,617.1972	8,860.73480
Resident population: Hispanic or Latino Origin (%)	737	1.40	65.00	10.52	11.14
Resident population: Asian alone (%)	737	.10	5.40	1.23	0.997
Resident population: American Indian and Alaska Native alone	737	0.20	5.30	0.663	0.681
Resident population: Black alone	737	2.20	57.40	14.50	9.55
Educational attainment - persons 25 years and over - percent high school graduate or higher	268	43.50	91.70	71.89	11.68
Public School Enrollment	1,474	811	375,836	33,222.84	55,963.16
Earnings in all industries (TH$)	536	52,592	68,006,431	5,526,610.31	10,764,200.30
Civilian labor force unemployment rate	1,407	2.10	16.70	5.90	2.71
Civilian labor force unemployment	1,407	54	157,880	6,758.82	13,601.15
Private nonfarm employment - other services (except public administration)	536	0	40,202	4,592.95	81,44.843
Private nonfarm employment - accommodation and food services	804	0	95,294	10,062.55	17,906.01
Private nonfarm employment - arts, entertainment and recreation	536	0	49,117	2,260.70	5,606.93
Private nonfarm employment- health care and social assistance	804	0	122,417	12,367.01	21,123.119
Private nonfarm employment - educational services	536	0	28,595	1,792.99	4,242.089
Priv. nonfarm employment - admin., support, waste mgt. and remediation services	536	0	81,590	8,003.16	16,285.89
Private nonfarm employment - management of companies and enterprises	536	0	35,614	1,919.66	5,009.14
Private nonfarm employment - professional, scientific, and technical services	804	0	64,405	5,878.29	12,023.283
Private nonfarm employment including- real estate, rental and leasing	536	0	33,009	2402.82	4,911.39
Private nonfarm establishments - finance and insurance	804	0	56,447	5,213.88	11,398.25
Private nonfarm employment - information	536	0	25,166	2548.70	5449.417

	N	Minimum	Maximum	Mean	Std. Deviation
Private nonfarm employment - transportation and warehousing	536	0	52612	2,964.27	7,948.21
Private nonfarm employment - retail trade	804	0	125,025	14,124.77	23292.34
Private nonfarm employment - wholesale trade	804	0	74,361	4,562.36	11,280.23
Private nonfarm employment - manufacturing	804	0	62,468	5,583.80	10,214.88
Private nonfarm employment - construction	804	0	51,705	6151.42	9,947.62
Private nonfarm employment - utilities	536	0	4,135	179.18	473.00
Private nonfarm employment -mining	536	0	1,904	44.76	144.87
Private nonfarm employment - forestry, fishing, hunting, and agriculture support	536	0	2,582	149.56	348.67
Private nonfarm employment	2,010	203	873,644	74,797.15	146,322.29
Median household income ($)	1005	15,380	67,238	35,855.36	8,390.29
Median Age (Complete Count)	268	25.10	62.70	38.27	6.67
Resident population 65 years and over (%)	737	7.50	43.40	17.33	6.28
Resident population under 5 years (%)	737	2.40	9.20	5.87	1.02
Civilian labor force	1,407	2,200	1,272,704	116,021.68	198,783.69
Resident population	2,077	4,035	2,500,625	216,367.51	366,839.06
Injuries	2,076	0	158	1.90	9.78
Fatalities	2,076	0	25	0.42	1.29
Property damage	2,076	0.00	2,533,483,333	19,242,906	151,947,277
Crop damage	2,076	0.00	312,666,667	2,387,734	17,580,306
Households with income of $100,000 or more	201	12.00	141,324	10,320.95	21,808.74

Table A.4: Correlation Table for Florida

		Fatalities	Injuries	Property damage	Crop damage
Social Vulnerability Index	Pearson Correlation	-0.016	-0.041	0.229***	0.138
	Sig. (2-tailed)	0.852	.640	0.008	0.113
	N	133	133	133	133
Population below poverty level	Pearson Correlation	.533***	.360***	0.468***	0.520***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	201	201	201	201

		Fatalities	Injuries	Property damage	Crop damage
Employment status - in labor force, civilian labor force, employed, females (abs)	Pearson Correlation	0.392***	0.306***	0.401***	0.414***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	268	268	268	268
Cropland - total (acres) (adjusted)	Pearson Correlation	0.108	0.060	0.017	0.353***
	Sig. (2-tailed)	0.128	0.401	0.810	0.000
	N	201	201	201	201
Farm operators by principal occupation - farming (adjusted)	Pearson Correlation	0.187***	0.277***	0.147**	0.067
	Sig. (2-tailed)	0.008	0.000	0.037	0.346
	N	201	201	201	201
Federal Government insurance (TH$)	Pearson Correlation	0.302***	0.121***	0.199***	0.336***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	1,875	1,875	1,875	1,875
Federal Government expenditure - direct payments for individuals, retirement and disability (TH$)	Pearson Correlation	0.326***	0.169***	0.171***	0.282***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	1,875	1,875	1,875	1,875
Federal Government expenditure (TH$)	Pearson Correlation	0.291***	0.137***	0.161***	0.311***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	1,875	1,875	1,875	1,875
Hospital insurance and/or supplemental medical insurance (Medicare) - disabled persons enrolled	Pearson Correlation	0.339***	0.104**	0.189***	0.321***
	Sig. (2-tailed)	0.000	0.010	0.000	0.000
	N	603	603	603	603
Hospital insurance and/or supplemental medical insurance (Medicare) - aged persons enrolled	Pearson Correlation	0.281***	0.128***	0.216***	0.396***
	Sig. (2-tailed)	0.000	0.001	0.000	0.000
	N	670	670	670	670
Hospital insurance and/or supplemental medical insurance (Medicare) - total persons enrolled	Pearson Correlation	0.282***	0.127***	0.214***	0.390***
	Sig. (2-tailed)	0.000	0.001	0.000	0.000
	N	670	670	670	670
Female householders, no husband present	Pearson Correlation	0.388***	0.364***	0.432***	0.535***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	267	267	267	267
Total housing units	Pearson Correlation	0.457***	0.430***	0.389***	0.451***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	267	267	267	267
Owner-occupied housing units - percent of total occupied housing units	Pearson Correlation	-0.195***	-0.21***	-0.117**	-0.162***
	Sig. (2-tailed)	0.000	0.000	0.033	0.003
	N	334	334	334	334

		Fatalities	Injuries	Property damage	Crop damage
Median value of specified owner-occupied housing units ($)	Pearson Correlation	0.213***	0.086	0.065	0.072
	Sig. (2-tailed)	0.000	0.160	0.289	0.242
	N	268	268	268	268
Median gross rent of specified renter-occupied housing units paying cash rent	Pearson Correlation	0.261***	0.090	0.099	0.102*
	Sig. (2-tailed)	0.000	0.143	0.107	0.097
	N	268	268	268	268
Housing units by units in structure - mobile home or trailer	Pearson Correlation	0.310***	0.464***	0.090	0.074
	Sig. (2-tailed)	0.000	0.000	0.204	0.293
	N	201	201	201	201
Components of change - net international migration	Pearson Correlation	0.279***	0.062	0.177***	0.224***
	Sig. (2-tailed)	0.000	0.109	0.000	0.000
	N	670	670	670	670
Components of change - net domestic migration	Pearson Correlation	-0.064	0.084**	0.070*	-0.017
	Sig. (2-tailed)	0.100	0.029	0.072	0.669
	N	670	670	670	670
Place of birth, foreign-born (%)	Pearson Correlation	0.154*	0.156*	0.447***	0.481***
	Sig. (2-tailed)	0.075	0.072	0.000	0.000
	N	134	134	134	134
Urban population	Pearson Correlation	0.380***	0.321***	0.545***	0.534***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	201	201	201	201
Rural population	Pearson Correlation	0.096	-0.012	-0.074	-0.078
	Sig. (2-tailed)	0.174	0.870	0.296	0.269
	N	201	201	201	201
Social security: disabled workers - benefit recipients	Pearson Correlation	0.286***	0.147***	0.147***	0.271***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	1,406	1,406	1,406	1,406
Social security - benefit recipients	Pearson Correlation	0.314***	0.174***	0.148***	0.300***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	1,540	1,540	1,540	1,540
Adjusted gross income- IRS (TH$)	Pearson Correlation	0.330***	0.067	0.240***	0.283***
	Sig. (2-tailed)	0.000	0.222	0.000	0.000
	N	335	335	335	335
Local government finances - direct general expenditures for health (TH$)	Pearson Correlation	0.415**	0.189**	0.057	0.066
	Sig. (2-tailed)	0.000	0.002	0.349	0.280
	N	268	268	268	268

		Fatalities	Injuries	Property damage	Crop damage
Local government finances - direct general expenditures (TH$)	Pearson Correlation	0.420***	0.214***	0.223***	0.272***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	335	335	335	335
Local government finances - general revenue, total FY (TH$)	Pearson Correlation	0.424***	0.218***	0.224***	0.270***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	335	335	335	335
Total Females, Percent	Pearson Correlation	0.177***	0.072*	0.085**	0.084**
	Sig. (2-tailed)	0.000	0.050	0.021	0.023
	N	736	736	736	736
Related children age 5 to 17 in families in poverty (%)	Pearson Correlation	-0.159***	-0.09***	-0.115***	-0.058*
	Sig. (2-tailed)	0.000	0.006	0.000	0.074
	N	938	938	938	938
People under age 18 in poverty (%)	Pearson Correlation	-0.142***	-0.09***	-0.112***	-0.054*
	Sig. (2-tailed)	0.000	0.006	0.001	0.098
	N	938	938	938	938
People of all ages in poverty (%)	Pearson Correlation	-0.163***	-0.12***	-0.111***	-0.054
	Sig. (2-tailed)	0.000	0.000	0.001	0.101
	N	938	938	938	938
People of all ages in poverty (abs)	Pearson Correlation	0.258***	0.102***	0.156***	0.360***
	Sig. (2-tailed)	0.000	0.002	0.000	0.000
	N	938	938	938	938
Households with income of $150,000 or more	Pearson Correlation	0.477***	0.403***	0.406***	0.443***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	201	201	201	201
Households with income of $125,000 to $149,999	Pearson Correlation	0.464***	0.412***	0.363***	0.392***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	201	201	201	201
Households with income of $100,000 to $124,999	Pearson Correlation	0.478***	0.444***	0.411***	0.425***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	201	201	201	201
Per capita personal income ($)	Pearson Correlation	0.181***	0.130***	0.198***	0.155***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	1,876	1,876	1,876	1,876
Resident population: Hispanic or Latino Origin (%)	Pearson Correlation	0.088*	0.048	0.109**	0.289**
	Sig. (2-tailed)	0.018	0.197	0.003	0.000
	N	736	736	736	736

		Fatalities	Injuries	Property damage	Crop damage
Resident population: Asian alone (%)	Pearson Correlation	0.222***	0.041	0.076**	0.048
	Sig. (2-tailed)	0.000	0.264	0.040	0.189
	N	736	736	736	736
Resident population: American Indian and Alaska Native alone	Pearson Correlation	-0.052	-0.019	-0.023	-0.030
	Sig. (2-tailed)	0.157	0.601	0.540	0.412
	N	736	736	736	736
Resident population: Black alone	Pearson Correlation	0.005	-0.053	-0.032	0.003
	Sig. (2-tailed)	0.884	0.153	0.388	0.935
	N	736	736	736	736
Educational attainment - persons 25 years and over - percent high school graduate or higher	Pearson Correlation	0.255***	0.133**	0.047	0.033
	Sig. (2-tailed)	0.000	0.029	0.447	0.585
	N	268	268	268	268
Public School Enrollment	Pearson Correlation	0.303***	0.128***	0.167***	0.345***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	1,474	1,474	1,474	1,474
Earnings in all industries (TH$)	Pearson Correlation	0.315***	0.079*	0.205***	0.313***
	Sig. (2-tailed)	0.000	0.066	0.000	0.000
	N	536	536	536	536
Civilian labor force unemployment rate	Pearson Correlation	-0.021	-0.060**	-0.077***	0.050*
	Sig. (2-tailed)	0.433	0.024	0.004	0.059
	N	1406	1406	1406	1406
Civilian labor force unemployment	Pearson Correlation	0.279***	0.103***	0.080***	0.333***
	Sig. (2-tailed)	0.000	0.000	0.003	0.000
	N	1,406	1,406	1,406	1,406
Private nonfarm employment - other services (except public administration)	Pearson Correlation	0.311***	0.075*	0.174***	0.226***
	Sig. (2-tailed)	0.000	0.085	0.000	0.000
	N	536	536	536	536
Private nonfarm employment - accommodation and food services	Pearson Correlation	0.281***	0.115***	0.177***	0.313***
	Sig. (2-tailed)	0.000	0.001	0.000	0.000
	N	804	804	804	804
Private nonfarm employment - arts, entertainment and recreation	Pearson Correlation	0.156**	0.046	0.115**	0.153**
	Sig. (2-tailed)	0.000	0.290	0.008	0.000
	N	536	536	536	536
Private nonfarm employment- health care and social assistance	Pearson Correlation	0.283***	0.106***	0.181***	0.343***
	Sig. (2-tailed)	0.000	0.002	0.000	0.000
	N	804	804	804	804

		Fatalities	Injuries	Property damage	Crop damage
Private nonfarm employment - educational services	Pearson Correlation	0.337***	0.058	0.188***	0.245***
	Sig. (2-tailed)	0.000	0.179	0.000	0.000
	N	536	536	536	536
Priv. nonfarm employment - admin., support, waste mgt. and remediation services	Pearson Correlation	0.314***	0.081*	0.169***	0.223***
	Sig. (2-tailed)	0.000	0.060	0.000	0.000
	N	536	536	536	536
Private nonfarm employment - management of companies and enterprises	Pearson Correlation	0.192***	0.041	0.115***	0.172***
	Sig. (2-tailed)	0.000	0.343	0.008	0.000
	N	536	536	536	536
Private nonfarm employment - professional, scientific, and technical services	Pearson Correlation	0.256***	0.093***	0.159***	0.304***
	Sig. (2-tailed)	0.000	0.009	0.000	0.000
	N	804	804	804	804
Private nonfarm employment including- real estate, rental and leasing	Pearson Correlation	0.302***	0.077*	0.174***	0.228***
	Sig. (2-tailed)	0.000	0.076	0.000	0.000
	N	536	536	536	536
Private nonfarm establishments - finance and insurance	Pearson Correlation	0.223***	0.076**	0.126***	0.268***
	Sig. (2-tailed)	0.000	0.031	0.000	0.000
	N	804	804	804	804
Private nonfarm employment - information	Pearson Correlation	0.282***	0.059	0.147***	0.203***
	Sig. (2-tailed)	0.000	0.170	0.001	0.000
	N	536	536	536	536
Private nonfarm employment - transportation and warehousing	Pearson Correlation	0.251***	0.044	0.144***	0.193***
	Sig. (2-tailed)	0.000	0.304	0.001	0.000
	N	536	536	536	536
Private nonfarm employment - retail trade	Pearson Correlation	0.297***	0.115***	0.189***	0.360***
	Sig. (2-tailed)	0.000	0.001	0.000	0.000
	N	804	804	804	804
Private nonfarm employment - wholesale trade	Pearson Correlation	0.259***	0.087**	0.159***	0.390***
	Sig. (2-tailed)	0.000	0.013	0.000	0.000
	N	804	804	804	804
Private nonfarm employment - manufacturing	Pearson Correlation	0.239***	0.112***	0.135***	0.337***
	Sig. (2-tailed)	0.000	0.001	0.000	0.000
	N	804	804	804	804
Private nonfarm employment - construction	Pearson Correlation	0.287***	0.125***	0.195***	0.310***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	804	804	804	804

		Fatalities	Injuries	Property damage	Crop damage
Private nonfarm employment - utilities	Pearson Correlation	0.145***	0.070	0.146***	0.178***
	Sig. (2-tailed)	0.001	0.104	0.001	0.000
	N	536	536	536	536
Private nonfarm employment -mining	Pearson Correlation	0.192***	0.041	0.147***	0.201***
	Sig. (2-tailed)	0.000	0.343	0.001	0.000
	N	536	536	536	536
Private nonfarm employment - forestry, fishing, hunting, and agriculture support	Pearson Correlation	0.042	0.000	0.172***	0.084*
	Sig. (2-tailed)	0.337	0.995	0.000	0.053
	N	536	536	536	536
Private nonfarm employment	Pearson Correlation	0.299***	0.139***	0.135***	0.287***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	2,010	2,010	2,010	2,010
Median household income ($)	Pearson Correlation	0.137***	.048	0.099***	0.035
	Sig. (2-tailed)	0.000	0.131	0.002	.268
	N	1,005	1,005	1,005	1,005
Median Age (Complete Count)	Pearson Correlation	0.068	0.018	-0.016	0.044
	Sig. (2-tailed)	0.271	0.768	0.795	0.479
	N	267	267	267	267
Resident population 65 years and over (%)	Pearson Correlation	0.000	0.106***	0.049	0.044
	Sig. (2-tailed)	0.996	0.004	0.181	0.228
	N	736	736	736	736
Resident population under 5 years (%)	Pearson Correlation	0.049	-0.034	0.035	0.037
	Sig. (2-tailed)	0.184	0.357	0.336	0.318
	N	736	736	736	736
Civilian labor force	Pearson Correlation	0.319***	0.140***	0.150***	0.328***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	1406	1406	1406	1406
Resident population	Pearson Correlation	0.323***	0.148***	0.145***	0.305***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	2,076	2,076	2,076	2,076
Households with income of $100,000 or more	Pearson Correlation	0.477***	0.422***	0.401***	0.427***
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	201	201	201	201

Table A.5: Descriptive Statistics for Louisiana

	N	Minimum	Maximum	Mean	Std. Deviation
Year	1984	1980	2010	1995	8.95
Social Vulnerability Index	128	-5.152	7.466	1.196	2.569
Federal Government insurance (TH$)	1,792	0.00	2,7833,631	563,024.85	2,274,271.87
Population below poverty level	192	616	152,042	13,582.03	19,661.26
Employment status - in labor force, civilian labor force, employed, females (abs)	256	892	101,944	12,460.48	20,137.97
Cropland - total (acres) (adjusted)	192	0.00	272,295	79,829.52	76,348.26
Farm operators by principal occupation - farming (adjusted)	192	1	709	212.04	149.55
Federal Government expenditure - direct payments for individuals, retirement and disability (TH$)	1,792	4,370	1,243,869	117,540.40	180,952.66
Federal Government expenditure (TH$)	1,792	7,278.00	18,564,543	397,211.39	1,014,228.35
Hospital insurance and/or supplemental medical insurance (Medicare) - disabled persons enrolled	576	101	14,856	1,803.42	2,351.89
Hospital insurance and/or supplemental medical insurance (Medicare) - aged persons enrolled	640	742	55,413	7,752.96	10,534.48
Hospital insurance and/or supplemental medical insurance (Medicare) - total persons enrolled	640	850	67,552	9,533.83	12,795.64
Female householders, no husband present	256	106.00	45,328.00	3,047.95	5,780.91
Total housing units	256	2,898.00	226,452.00	27,643.84	40,929.43
Owner-occupied housing units - percent of total occupied housing units	320	39.70	87.80	72.99	7.64
Median value of specified owner-occupied housing units ($)	256	21,000.00	1,88,300.00	61,952.34	31,764.99
Median gross rent of specified renter-occupied housing units paying cash rent	256	89.00	1,046.00	351.55	170.04
Housing units by units in structure - mobile home or trailer	192	308	14,381	3,600.55	2,798.539
Components of change - net international migration	640	-1,112	984	53.43	164.19

	N	Minimum	Maximum	Mean	Std. Deviation
Components of change - net domestic migration	640	-248,723	29,040	-498.14	10,340.13
Place of birth, foreign-born (%)	128	0.00	9.40	1.48	1.39
Urban population	192	0	557,028	46,908.03	96,404.23
Rural population	192	200	69,125	20,252.65	13,343.050
Social security: disabled workers - benefit recipients	1,344	70	12,870	1,494.59	1,967.049
Social security - benefit recipients	1,472	867	92,680	10,992.56	14,736.980
Adjusted gross income- IRS (TH$)	320	61,418	9,447,386	1,184,600.83	1,746,877.65
Local government finances - direct general expenditures for health (TH$)	256	0.00	27,320.00	1,077.48	2,922.32
Local government finances - direct general expenditures (TH$)	320	7,158	1,411,402.00	122901.32	205672.04
Local government finances - general revenue, total FY (TH$)	320	7,848	1,536,705	127,146.93	217,560.04
Total Females (%)	704	34.10	53.10	50.54	2.60
Related children age 5 to 17 in families in poverty (%)	896	12.30	60.20	27.04	7.86
People under age 18 in poverty (%)	896	13.50	62.00	28.81	7.92
People of all ages in poverty (%)	896	9.90	48.60	20.63	5.83
People of all ages in poverty (abs)	896	805	156,932	12,598.47	18,213.63
Households with income of $150,000 or more	192	2	12,108	754.15	1,737.447
Households with income of $125,000 to $149,999	192	0	3,689	284.27	619.433
Households with income of $100,000 to $124,999	192	0	11,336	918.14	1,780.227
Per capita personal income ($)	1,792	451.00	65,806	15,996.94	6,716.36
Resident population: Hispanic or Latino Origin (%)	704	0.60	12.40	2.17	1.59
Resident population: Asian alone (%)	704	0.00	3.90	0.699	0.772
Resident population: American Indian and Alaska Native alone (%)	704	0.00	8.60	0.681	1.201
Resident population: Black alone (%)	704	1.70	69.00	31.59	14.36
Educational attainment - persons 25 years and over - percent high school graduate or higher	256	37.30	88.20	64.69	12.34
Public School Enrollment	1,408	0	86,028	11,836.37	14,720.29
Earnings in all industries (thousand $)	512	45,812	14,493,749	1,395,250.08	2,607,032.09
Civilian labor force unemployment rate	1,344	0.00	23.30	7.2486	2.79
Civilian labor force unemployment	1,344	0	16,752	1,860.02	2,537.28
Private nonfarm employment - other services	512	0	13,668	1,167.05	2,242.64

	N	Minimum	Maximum	Mean	Std. Deviation
(except public administration)					
Private nonfarm employment - accommodation and food services	768	0	37,444	2,652.05	5,595.54
Private nonfarm employment - arts, entertainment and recreation	512	0	10,132	390.32	1,182.45
Private nonfarm employment - health care and social assistance	768	0	36,413	3,921.21	7,133.13
Private nonfarm employment - educational services	512	0	15,747	502.21	1,858.877
Priv. nonfarm employment - admin., support, waste mgt. and remediation services	512	0	22,126	1,531.58	3,679.84
Private nonfarm employment - management of companies and enterprises	512	0	3629	223.06	650.21
Private nonfarm employment - professional, scientific, and technical services	768	0	18,425	1,264.40	3,027.11
Private nonfarm employment - real estate, rental and leasing	512	0	6,610	465.50	971.35
Private nonfarm establishments - finance and insurance	768	0	12,683	1,029.59	2,263.57
Private nonfarm employment for pay period - information	512	0	5,851	435.81	1,046.05
private nonfarm employment for pay period transportation and warehousing	512	0	11,499	992.55	1734.80
Private nonfarm employment for pay period including March 12, 1998 - retail trade	768	0	33,450	3,595.50	6,108.46
Private nonfarm employment for pay period including - wholesale trade	768	0	15,384	1,171.15	2,395.27
Private nonfarm employment for pay period including manufacturing	768	0	17,811	2,297.55	3,132.72
Private nonfarm employment for pay period including- construction	768	0	43,439	1,938.88	5,021.56
Private nonfarm employment for pay period - utilities	512	0	1,276	75.01	196.04
Private nonfarm employment for pay period-mining	512	0	11,585	468.33	1,203.39
Private nonfarm employment for pay period incl. forestry, fishing,	512	0	765	57.45	95.12

	N	Minimum	Maximum	Mean	Std. Deviation
hunting, and agriculture support					
Private nonfarm employment	1,920	322	239,910	21,967.73	42,830.48
Median household income ($)	960	9,791	61,345	31,371.58	8,147.12
Median Age (Complete Count)	256	23.30	42.50	32.73	4.27
Resident population 65 years and over (%)	704	7.20	18.50	12.73	2.28
Resident population under 5 years (%)	704	3.60	9.50	6.95	0.765
Civilian labor force	1,338	0	235,300	30,587.24	45,440.80
Resident population (complete count)	1,984	5,252	561,588	68,457.64	97,559.240
Injuries	1,984	0	90	1.71	6.66
Fatalities	1,984	0	510	.50	11.73
Property damage	1,984	0.00	6,031,660,260	3,0391,675.47	339,212,337.07
Crop damage	1,984	0.00	701,600,000	1,350,386.99	16,350,317.90
Households with income of $100,000 or more	192	13.00	27,133	1,956.56	4,085.76

Table A.6: Correlation Table for Louisiana

		Fatalities	Injuries	Property damage	Crop damage
Social Vulnerability Index	Pearson Correlation	0.121	0.056	0.116	0.129
	Sig. (2-tailed)	0.172	0.527	0.190	0.148
	N	128	128	128	128
Federal Government insurance (TH$)	Pearson Correlation	0.148***	0.007	0.159***	-0.012
	Sig. (2-tailed)	0.000	0.762	0.000	0.613
	N	1,792	1,792	1,792	1,792
Population below poverty level	Pearson Correlation	0.194***	0.052	-0.034	-0.051
	Sig. (2-tailed)	0.007	0.477	0.644	0.481
	N	192	192	192	192
Employment status - in labor force, civilian labor force, employed, females (abs)	Pearson Correlation	0.361***	0.098	-0.019	0.118
	Sig. (2-tailed)	0.000	0.120	0.764	0.059
	N	256	256	256	256
Cropland - total (acres) (adjusted)	Pearson Correlation	-0.014	-0.086	0.088	0.221***
	Sig. (2-tailed)	.850	.237	.223	.002
	N	192	192	192	192
Farm operators by principal occupation - farming (adjusted)	Pearson Correlation	0.040	-0.036	0.224***	0.327***
	Sig. (2-tailed)	0.585	0.624	0.002	0.000
	N	192	192	192	192
	Pearson Correlation	0.155***	0.022	0.131***	0.001

		Fatalities	Injuries	Property damage	Crop damage
Federal Government expenditure - direct payments for individuals, retirement and disability (TH$)	Sig. (2-tailed)	0.000	0.349	0.000	0.972
	N	1,792	1,792	1,792	1,792
Federal Government expenditure (TH$)	Pearson Correlation	0.180***	0.006	0.100***	-0.005
	Sig. (2-tailed)	0.000	0.809	0.000	0.838
	N	1,792	1,792	1,792	1,792
Hospital insurance and/or supplemental medical insurance (Medicare) - disabled persons enrolled	Pearson Correlation	0.252***	0.074*	.193***	0.039
	Sig. (2-tailed)	.000	.078	.000	0.352
	N	576	576	576	576
Hospital insurance and/or supplemental medical insurance (Medicare) - aged persons enrolled	Pearson Correlation	0.177***	0.080**	0.146***	0.077*
	Sig. (2-tailed)	0.000	0.044	0.000	0.053
	N	640	640	640	640
Hospital insurance and/or supplemental medical insurance (Medicare) - total persons enrolled	Pearson Correlation	0.190***	0.080**	0.154***	0.072*
	Sig. (2-tailed)	0.000	0.044	0.000	0.071
	N	640	640	640	640
Female householders, no husband present	Pearson Correlation	0.228***	0.032	0.017	-0.034
	Sig. (2-tailed)	0.000	0.608	0.792	0.593
	N	256	256	256	256
Total housing units	Pearson Correlation	0.373***	0.078	0.045	-0.020
	Sig. (2-tailed)	0.000	0.214	0.475	0.754
	N	256	256	256	256
Owner-occupied housing units - percent of total occupied housing units	Pearson Correlation	-0.273***	-0.074	-0.160***	-0.047
	Sig. (2-tailed)	0.000	0.185	0.004	0.403
	N	320	320	320	320
Median value of specified owner-occupied housing units ($)	Pearson Correlation	0.082	0.071	-0.036	0.077
	Sig. (2-tailed)	0.193	0.258	0.567	0.222
	N	256	256	256	256
Median gross rent of specified renter-occupied housing units paying cash rent	Pearson Correlation	0.086	0.089	0.012	0.069
	Sig. (2-tailed)	0.172	0.154	0.848	0.269
	N	256	256	256	256
Housing units by units in structure - mobile home or trailer	Pearson Correlation	0.201***	0.202***	-0.058	0.197***
	Sig. (2-tailed)	0.005	0.005	0.423	0.006
	N	192	192	192	192
Components of change - net international migration	Pearson Correlation	0.136***	0.100**	0.131***	-0.031
	Sig. (2-tailed)	0.001	0.011	0.001	0.435
	N	640	640	640	640
Components of change - net domestic migration	Pearson Correlation	-0.032	0.061	-0.008	0.008

		Fatalities	Injuries	Property damage	Crop damage
	Sig. (2-tailed)	0.413	0.126	0.840	0.839
	N	640	640	640	640
Place of birth, foreign-born (%)	Pearson Correlation	0.171*	0.014	-0.079	-0.020
	Sig. (2-tailed)	0.053	0.872	0.376	0.822
	N	128	128	128	128
Urban population	Pearson Correlation	0.398***	0.114	0.034	0.116
	Sig. (2-tailed)	0.000	0.117	0.643	0.110
	N	192	192	192	192
Rural population	Pearson Correlation	0.082	0.078	0.246***	0.155**
	Sig. (2-tailed)	0.257	0.283	0.001	0.032
	N	192	192	192	192
Social security: disabled workers - benefit recipients	Pearson Correlation	0.075***	0.086***	0.091***	-0.004
	Sig. (2-tailed)	0.006	0.002	0.001	0.874
	N	1,344	1,344	1,344	1,344
Social security - benefit recipients	Pearson Correlation	0.074***	0.065**	0.077***	-0.002
	Sig. (2-tailed)	0.005	0.012	0.003	0.939
	N	1,472	1,472	1,472	1,472
Adjusted gross income- IRS (TH$)	Pearson Correlation	0.055	0.199***	0.084	0.015
	Sig. (2-tailed)	0.329	0.000	0.135	0.791
	N	320	320	320	320
Local government finances - direct general expenditures for health (TH$)	Pearson Correlation	0.014	0.000	0.187***	0.051
	Sig. (2-tailed)	0.818	0.999	0.003	0.412
	N	256	256	256	256
Local government finances - direct general expenditures (TH$)	Pearson Correlation	0.096*	0.103*	0.258***	0.110**
	Sig. (2-tailed)	0.085	0.067	0.000	0.049
	N	320	320	320	320
Local government finances - general revenue, total FY (TH$)	Pearson Correlation	0.100*	0.099*	0.248***	0.102*
	Sig. (2-tailed)	0.073	0.076	0.000	0.068
	N	320	320	320	320
Total Females (%)	Pearson Correlation	0.043	0.040	0.022	0.037
	Sig. (2-tailed)	0.250	0.291	0.554	0.330
	N	704	704	704	704
Related children age 5 to 17 in families in poverty (%)	Pearson Correlation	0.047	-0.085**	-0.046	-0.068**
	Sig. (2-tailed)	0.162	0.011	0.166	0.040
	N	896	896	896	896
People under age 18 in poverty (%)	Pearson Correlation	0.036	-0.09***	-0.050	-0.064*

		Fatalities	Injuries	Property damage	Crop damage
	Sig. (2-tailed)	0.282	0.009	0.138	0.054
	N	896	896	896	896
People of all ages in poverty (%)	Pearson Correlation	0.017	-0.10***	-0.058*	-0.059*
	Sig. (2-tailed)	0.604	0.003	0.081	0.077
	N	896	896	896	896
People of all ages in poverty (abs)	Pearson Correlation	0.197***	0.067**	0.120***	0.033
	Sig. (2-tailed)	0.000	0.045	0.000	0.320
	N	896	896	896	896
Households with income of $150,000 or more	Pearson Correlation	0.122*	0.015	-0.022	-0.217***
	Sig. (2-tailed)	0.093	0.836	0.761	0.003
	N	192	192	192	192
Households with income of $125,000 to $149,999	Pearson Correlation	0.160**	0.063	-0.028	-0.220***
	Sig. (2-tailed)	0.027	0.383	0.700	0.002
	N	192	192	192	192
Households with income of $100,000 to $124,999	Pearson Correlation	0.126*	0.032	-0.026	-0.265***
	Sig. (2-tailed)	0.082	0.664	0.720	0.000
	N	192	192	192	192
Per capita personal income ($)	Pearson Correlation	-0.019	-0.08***	0.041*	0.065***
	Sig. (2-tailed)	0.418	0.001	0.082	0.006
	N	1,792	1,792	1,792	1,792
Resident population: Hispanic or Latino Origin (%)	Pearson Correlation	0.063*	0.025	0.114***	-0.035
	Sig. (2-tailed)	0.096	0.507	0.002	0.350
	N	704	704	704	704
Resident population: Asian alone (%)	Pearson Correlation	0.108***	0.083**	0.158***	-0.014
	Sig. (2-tailed)	0.004	0.027	0.000	0.719
	N	704	704	704	704
Resident population: American Indian and Alaska Native alone (%)	Pearson Correlation	-0.012	0.072*	0.023	-0.025
	Sig. (2-tailed)	0.746	0.055	0.547	0.507
	N	704	704	704	704
Resident population: Black alone (%)	Pearson Correlation	0.079**	-0.025	-0.034	0.051
	Sig. (2-tailed)	0.037	0.506	0.373	0.175
	N	704	704	704	704
Educational attainment - persons 25 years and over - percent high school graduate or higher	Pearson Correlation	0.089	0.068	-0.024	0.118*
	Sig. (2-tailed)	0.154	0.280	0.704	0.060
	N	256	256	256	256
Public School Enrollment	Pearson Correlation	0.007	0.144***	0.026	0.058**

		Fatalities	Injuries	Property damage	Crop damage
	Sig. (2-tailed)	0.784	0.000	0.337	0.028
	N	1408	1408	1408	1408
Earnings in all industries (thousand $)	Pearson Correlation	0.185***	0.178***	0.127***	0.022
	Sig. (2-tailed)	0.000	0.000	0.004	0.615
	N	512	512	512	512
Civilian labor force unemployment rate	Pearson Correlation	-0.095***	-0.054**	-0.152***	0.060**
	Sig. (2-tailed)	0.000	0.047	0.000	0.027
	N	1,344	1,344	1,344	1,344
Civilian labor force unemployment	Pearson Correlation	-0.014	0.099***	-0.031	-0.004
	Sig. (2-tailed)	0.618	0.000	0.257	0.871
	N	1,344	1,344	1,344	1,344
Private nonfarm employment - other services (except public administration)	Pearson Correlation	0.173***	0.138***	0.128***	-0.008
	Sig. (2-tailed)	0.000	0.002	0.004	0.851
	N	512	512	512	512
Private nonfarm employment - accommodation and food services	Pearson Correlation	0.230***	0.088**	0.141***	0.009
	Sig. (2-tailed)	0.000	0.014	0.000	0.797
	N	768	768	768	768
Private nonfarm employment - arts, entertainment and recreation	Pearson Correlation	0.373**	.150**	0.206**	-0.028
	Sig. (2-tailed)	0.000	0.001	0.000	0.532
	N	512	512	512	512
Private nonfarm employment - health care and social assistance	Pearson Correlation	00.153***	0.068*	0.113***	0.054
	Sig. (2-tailed)	0.000	0.061	0.002	0.136
	N	768	768	768	768
Private nonfarm employment - educational services	Pearson Correlation	0.341**	0.130**	0.162**	-0.029
	Sig. (2-tailed)	0.000	0.003	0.000	0.509
	N	512	512	512	512
Priv. nonfarm employment - admin., support, waste mgt. and remediation services	Pearson Correlation	0.165***	0.124***	0.146***	-0.033
	Sig. (2-tailed)	0.000	0.005	0.001	0.457
	N	512	512	512	512
Private nonfarm employment - management of companies and enterprises	Pearson Correlation	0.146***	0.196***	0.124***	-0.012
	Sig. (2-tailed)	0.001	0.000	0.005	0.785
	N	512	512	512	512
Private nonfarm employment - professional, scientific, and technical services	Pearson Correlation	0.158***	0.051	0.108***	0.007
	Sig. (2-tailed)	0.000	0.162	0.003	0.839
	N	768	768	768	768
Private nonfarm employment - real estate, rental and leasing	Pearson Correlation	0.001	0.196***	0.091**	0.047

		Fatalities	Injuries	Property damage	Crop damage
	Sig. (2-tailed)	0.975	0.000	0.039	0.289
	N	512	512	512	512
Private nonfarm establishments - finance and insurance	Pearson Correlation	0.154***	0.035	0.111***	0.006
	Sig. (2-tailed)	0.000	0.335	0.002	0.868
	N	768	768	768	768
Private nonfarm employment for pay period - information	Pearson Correlation	0.191***	0.143***	0.115***	-0.007
	Sig. (2-tailed)	0.000	0.001	0.009	0.867
	N	512	512	512	512
Private nonfarm employment for pay period transportation and warehousing	Pearson Correlation	0.217***	0.153***	0.187***	-0.013
	Sig. (2-tailed)	0.000	0.001	0.000	0.766
	N	512	512	512	512
Private nonfarm employment for pay period including March 12, 1998 - retail trade	Pearson Correlation	0.105***	0.068*	0.111***	0.041
	Sig. (2-tailed)	0.004	0.061	0.002	0.253
	N	768	768	768	768
Private nonfarm employment for pay period including - wholesale trade	Pearson Correlation	0.087**	0.071*	0.097***	0.046
	Sig. (2-tailed)	0.016	0.050	0.007	0.199
	N	768	768	768	768
Private nonfarm employment for pay period including manufacturing	Pearson Correlation	0.085**	0.096***	0.082**	0.085**
	Sig. (2-tailed)	0.019	0.008	0.023	0.019
	N	768	768	768	768
Private nonfarm employment for pay period including- construction	Pearson Correlation	0.037	0.025	0.044	0.011
	Sig. (2-tailed)	0.304	0.492	0.225	0.771
	N	768	768	768	768
Private nonfarm employment for pay period - utilities	Pearson Correlation	-0.001	0.049	0.059	-0.016
	Sig. (2-tailed)	0.983	0.271	0.182	0.723
	N	512	512	512	512
Private nonfarm employment for pay period-mining	Pearson Correlation	0.082*	0.223***	0.050	0.087**
	Sig. (2-tailed)	0.065	0.000	0.255	0.049
	N	512	512	512	512
Private nonfarm employment for pay period incl. forestry, fishing, hunting, and agriculture support	Pearson Correlation	-0.035	0.005	-0.076	0.017
	Sig. (2-tailed)	0.435	0.905	0.086	0.700
	N	512	512	512	512
Private nonfarm employment	Pearson Correlation	0.113***	0.080***	0.084***	0.042*
	Sig. (2-tailed)	0.000	0.000	0.000	0.064
	N	1,920	1,920	1,920	1,920
Median household income ($)	Pearson Correlation	0.008	0.059*	0.114***	0.063*

		Fatalities	Injuries	Property damage	Crop damage
	Sig. (2-tailed)	0.803	0.067	0.000	0.052
	N	960	960	960	960
Median Age (Complete Count)	Pearson Correlation	-0.032	-0.019	-0.082	0.156*
	Sig. (2-tailed)	0.605	0.767	0.190	0.013
	N	256	256	256	256
Resident population 65 years and over (%)	Pearson Correlation	-0.019	-0.048	-0.076**	0.068*
	Sig. (2-tailed)	0.606	0.200	0.043	0.072
	N	704	704	704	704
Resident population under 5 years (%)	Pearson Correlation	0.009	0.011	0.004	0.023
	Sig. (2-tailed)	0.815	0.778	0.921	0.543
	N	704	704	704	704
Civilian labor force	Pearson Correlation	0.089***	0.112***	0.003	-0.003
	Sig. (2-tailed)	0.001	0.000	0.917	0.918
	N	1,338	1,338	1,338	1,338
Resident population (complete count)	Pearson Correlation	0.110***	0.098***	0.085***	-0.003
	Sig. (2-tailed)	0.000	0.000	0.000	0.884
	N	1,984	1,984	1,984	1,984
Households with income of $100,000 or more	Pearson Correlation	0.131*	0.030	-0.025	-.0241***
	Sig. (2-tailed)	0.071	0.682	0.731	0.001
	N	192	192	192	192

Table A.7: Descriptive Statistics for Mississippi

	N	Minimum	Maximum	Mean	Std. Deviation
Year	2,542	1980	2010	1995	8.95
Social Vulnerability Index	164	-5.34	12.70	1.19	3.09
Population below poverty level	246	666	53,882	7,249.24	6,884.926
Employment status - in labor force, civilian labor force, employed, females (abs)	328	245	57,894	6,160.63	8,028.489
Cropland - total (acres) (adjusted)	246	5,747	431,241.00	71,860.84	76,420.57
Farm operators by principal occupation - farming (adjusted)	246	56	571	211.51	92.69
Federal Government insurance (TH$)	2,296	0.00	5,019,624	63,139.96	330,712.60

	N	Minimum	Maximum	Mean	Std. Deviation
Federal Government expenditure - direct payments for individuals, retirement and disability (TH$)	2,296	1,091	786,423	66,307.54	88,020.25
Federal Government expenditure (TH$)	2,296	3,471	5,756,159	205,407.34	425,253.52
Hospital insurance and/or supplemental medical insurance (Medicare) - disabled persons enrolled	738	42	8,149	1,230.05	1,103.33
Hospital insurance and/or supplemental medical insurance (Medicare) - aged persons enrolled	820	101	26,865	4,068.62	4,045.48
Hospital insurance and/or supplemental medical insurance (Medicare) - total persons enrolled	820	145	33,800	5,276.92	5,111.83
Female householders, no husband present	328	91.00	23,209.00	1,946.82	2,518.61
Total housing units	328	560.00	103,421	13,288.79	15,020.64
Median value of specified owner-occupied housing units ($)	328	18,700	171,400	52,330.49	25,264.32
Owner-occupied housing units - percent of total occupied housing units	410	44.60	88.60	74.08	9.02
Median gross rent of specified renter-occupied housing units paying cash rent	328	108.00	876.00	333.42	162.19
Housing units by units in structure - mobile home or trailer	246	142	9843	2102.23	1542.27
Components of change - net international migration	820	-1086	700	21.43	65.91
Components of change - net domestic migration	820	-25,517	6885	-44.57	1,204
Urban population (complete count)	246	0	220,539	15,417.22	31,193.17
Place of birth, foreign-born (%)	164	0.00	6.50	1.20	1.07
Rural population (complete count)	246	1909	46,123	16,853.15	7,824.92
Social security: disabled workers - benefit recipients	1,722	20	8,610	1,059.17	1,012.65
Social security - benefit recipients	1,886	190	41,780	6,227.13	6,006.56
Adjusted gross income- IRS (TH$)	410	7,451	4,147,904	531,539.79	719,399.82
Local government finances - direct general expenditures for health (TH$)	328	0.00	6,889	618.9878	863.54552
Local government finances - direct general expenditures (TH$)	410	563	733,514	55,699.67	82,971.98
Local government finances - general revenue, total FY (TH$)	410	553	718,254	56,825.32	83,482.80

	N	Minimum	Maximum	Mean	Std. Deviation
Related children age 5 to 17 in families in poverty (%)	1,148	9.20	63.70	28.72	8.62
People under age 18 in poverty (%)	1,148	10.70	63.40	30.39	8.64
Total Females (%)	902	39.80	54.20	51.45	1.90
People of all ages in poverty (%)	1,148	7.30	49.30	22.05	6.92
People of all ages in poverty (abs)	1,148	504	55,632	6,665.43	6,779.993
Households with income of $150,000 or more	246	0	4080	279.78	573.74
Households with income of $125,000 to $149,999	246	0	2474	167.34	363.93
Households with income of $100,000 to $124,999	246	0	5,124	369.36	742.751
Per capita personal income ($)	2,296	3,559	43,106	14,564.27	6,014.24
Resident population: Hispanic or Latino Origin (%)	902	0.40	11.10	1.67	1.24
Resident population: Asian alone (%)	902	0.00	3.00	0.4167	0.505
Resident population: American Indian and Alaska Native alone (%)	902	0.10	16.20	0.523	1.695
Resident population: Black alone (%)	902	2.60	86.40	40.23	20.07
Educational attainment - persons 25 years and over - percent high school graduate or higher	328	30.80	87.10	62.77	12.20
Public School Enrollment	1,804	0	45,108	6,100.36	6,604.07
Earnings in all industries (TH$)	656	5,680	8,113,138	588,118.05	1,009,318.46
Civilian labor force unemployment rate	1,722	1.80	29.40	8.18	3.03
Civilian labor force unemployment	1,722	55	11,184	1,065.26	1,113.355
Private nonfarm employment - other services (except public administration)	656	0	7,644	398.05	813.264
Private nonfarm employment - accommodation and food services	984	0	22,292	1,306.62	2,731.631
Private nonfarm employment - arts, entertainment and recreation	656	0	9,536	94.76	459.83
Private nonfarm employment - health care and social assistance	984	0	26,416	1,650.37	3,279.76
Private nonfarm employment - educational services	656	0	4539	156.81	496.59
Priv. nonfarm employment - admin., support, waste mgt. and remediation services	656	0	11,277	471.07	1,174.67
Private nonfarm employment - management	656	0	2535	83.23	263.46

	N	Minimum	Maximum	Mean	Std. Deviation
of companies and enterprises					
Private nonfarm employment - professional, scientific, and technical services	984	0	6984	360.32	850.53
Private nonfarm employment - real estate, rental and leasing	656	0	1,963	124.05	257.34
Private nonfarm establishments - finance and insurance	984	0	9,171	410.20	935.579
Private nonfarm employment - information	656	0	5,775	181.45	547.61
Private nonfarm employment - transportation and warehousing	656	0	5,424	374.86	728.15
Private nonfarm employment - retail trade	984	0	17,014	1716.77	2448.32
Private nonfarm employment - wholesale trade	984	0	7,516	442.44	877.63
Private nonfarm employment - manufacturing	984	0	17,845	2136.19	2,608.70
Private nonfarm employment - construction	984	0	7,489	587.00	1020.69
Private nonfarm employment - utilities	656	0	905	47.07	93.55
Private nonfarm employment -mining	656	0	882	25.20	91.73
Private nonfarm employment - forestry, fishing, hunting, and agriculture support	656	0	376	51.02	61.40
Private nonfarm employment	2,460	20	135,733	9,703.35	15,828.855
Median household income ($)	1,230	9,809	62,129	28,383.25	7,132.462
Median Age (Complete Count)	328	23.00	43.70	32.7076	4.26578
Resident population 65 years and over (%)	902	8.60	18.30	13.2612	2.07659
Resident population under 5 years (%)	902	3.80	10.40	7.1774	0.83394
Civilian labor force	1,722	638	128,563	15,500.83	19,010.160
Resident population (complete count)	2,542	1406	262,543	33,279.62	37,442.753
Injuries	2,540	0	117	0.84	5.94
Fatalities	2,540	0	79	0.16	1.87
Property damage	2,540	0.00	4,682,059,833	11,174,382	166,701,671
Crop damage	2,540	0.00	330,537,267	1,124,919	4,810,756
Households with income of $100,000 or more	246	3.00	10,967	816.48	1,658.97

Table A.8: Correlation Table for Mississippi

Variables		Fatalities	Injuries	Property damage	Crop damage
Social Vulnerability Index	Pearson Correlation	0.007	0.019	0.031	0.060
	Sig. (2-tailed)	0.929	0.808	0.689	0.446
	N	164	164	164	164
Population below poverty level	Pearson Correlation	0.211***	0.105	0.169***	0.049
	Sig. (2-tailed)	0.001	0.102	0.008	0.442
	N	245	245	245	245
Employment status - in labor force, civilian labor force, employed, females (abs)	Pearson Correlation	0.222***	0.105*	0.230***	-0.037
	Sig. (2-tailed)	0.000	0.058	0.000	0.508
	N	327	327	327	327
Cropland - total (acres) (adjusted)	Pearson Correlation	0.019	-0.020	-0.015	0.146**
	Sig. (2-tailed)	0.762	0.760	0.809	0.022
	N	246	246	246	246
Farm operators by principal occupation - farming (adjusted)	Pearson Correlation	0.115*	-0.002	0.064	-0.081
	Sig. (2-tailed)	0.072	0.972	0.316	0.206
	N	246	246	246	246
Federal Government insurance (TH$)	Pearson Correlation	0.120***	-0.010	0.109***	-0.020
	Sig. (2-tailed)	0.000	0.643	0.000	0.350
	N	2,294	2,294	2,294	2,294
Federal Government expenditure - direct payments for individuals, retirement and disability (TH$)	Pearson Correlation	0.161***	0.020	0.139***	0.007
	Sig. (2-tailed)	0.000	0.329	0.000	0.741
	N	2,294	2,294	2,294	2,294
Federal Government expenditure (TH$)	Pearson Correlation	0.132***	0.003	0.150***	0.008
	Sig. (2-tailed)	0.000	0.881	0.000	0.710
	N	2,294	2,294	2,294	2,294
Hospital insurance and/or supplemental medical insurance (Medicare) - disabled persons enrolled	Pearson Correlation	0.189***	0.055	0.160***	0.011
	Sig. (2-tailed)	0.000	0.137	0.000	0.763
	N	738	738	738	738
Hospital insurance and/or supplemental medical insurance (Medicare) - aged persons enrolled	Pearson Correlation	0.174***	0.077**	0.151***	-0.006
	Sig. (2-tailed)	0.000	0.027	0.000	0.870
	N	820	820	820	820
Hospital insurance and/or supplemental medical insurance (Medicare) - total persons enrolled	Pearson Correlation	0.177***	0.075**	0.153***	-0.001
	Sig. (2-tailed)	0.000	0.033	0.000	0.973
	N	820	820	820	820

Variables		Fatalities	Injuries	Property damage	Crop damage
Female householders, no husband present	Pearson Correlation	0.217***	0.040	0.022	0.001
	Sig. (2-tailed)	0.000	0.465	0.696	0.981
	N	328	328	328	328
Total housing units	Pearson Correlation	0.192***	0.046	-0.006	-0.053
	Sig. (2-tailed)	0.000	0.411	0.908	0.341
	N	328	328	328	328
Median value of specified owner-occupied housing units ($)	Pearson Correlation	0.130**	-0.021	0.194***	-0.072
	Sig. (2-tailed)	0.019	0.702	0.000	0.195
	N	327	327	327	327
Owner-occupied housing units - percent of total occupied housing units	Pearson Correlation	-0.152***	-0.075	-0.045	-0.172**
	Sig. (2-tailed)	0.002	0.130	0.367	0.000
	N	409	409	409	409
Median gross rent of specified renter-occupied housing units paying cash rent	Pearson Correlation	0.107*	-0.020	0.213***	-0.055
	Sig. (2-tailed)	0.053	0.713	0.000	0.321
	N	327	327	327	327
Housing units by units in structure - mobile home or trailer	Pearson Correlation	0.219***	0.118*	0.098	-0.047
	Sig. (2-tailed)	0.001	0.065	0.128	0.462
	N	245	245	245	245
Components of change - net international migration	Pearson Correlation	0.054	0.028	0.053	0.015
	Sig. (2-tailed)	0.122	0.431	0.126	0.658
	N	819	819	819	819
Components of change - net domestic migration	Pearson Correlation	0.015	0.011	0.011	-0.010
	Sig. (2-tailed)	0.661	0.764	0.760	0.767
	N	819	819	819	819
Urban population (complete count)	Pearson Correlation	0.231***	0.198***	0.269***	-0.006
	Sig. (2-tailed)	0.000	0.002	0.000	0.931
	N	246	246	246	246
Place of birth, foreign-born (%)	Pearson Correlation	0.141*	-0.018	0.109	-0.063
	Sig. (2-tailed)	0.073	0.821	0.168	0.423
	N	163	163	163	163
Rural population (complete count)	Pearson Correlation	0.128**	0.064	0.065	-0.087
	Sig. (2-tailed)	0.045	0.316	0.307	0.172
	N	246	246	246	246
Social security: disabled workers - benefit recipients	Pearson Correlation	0.129***	0.033	0.112***	0.011
	Sig. (2-tailed)	0.000	0.175	0.000	0.641
	N	1,721	1,721	1,721	1,721

Variables		Fatalities	Injuries	Property damage	Crop damage
Social security - benefit recipients	Pearson Correlation	0.120***	0.050**	0.101***	-0.002
	Sig. (2-tailed)	0.000	0.029	0.000	0.930
	N	1,885	1,885	1,885	1,885
Adjusted gross income- IRS (TH$)	Pearson Correlation	0.115**	0.063	0.099**	-0.028
	Sig. (2-tailed)	0.020	0.200	0.046	0.576
	N	410	410	410	410
Local government finances - direct general expenditures for health (TH$)	Pearson Correlation	0.078	0.036	0.011	-0.033
	Sig. (2-tailed)	0.158	0.511	0.837	0.555
	N	328	328	328	328
Local government finances - direct general expenditures (TH$)	Pearson Correlation	0.043	0.002	0.157***	-0.175***
	Sig. (2-tailed)	0.382	0.962	0.001	0.000
	N	410	410	410	410
Local government finances - general revenue, total FY (TH$)	Pearson Correlation	0.059	0.007	0.162***	-0.174***
	Sig. (2-tailed)	0.236	0.883	0.001	0.000
	N	410	410	410	410
Related children age 5 to 17 in families in poverty (%)	Pearson Correlation	-0.038	-0.067**	-0.014	0.149***
	Sig. (2-tailed)	0.196	0.023	0.632	0.000
	N	1147	1147	1147	1147
People under age 18 in poverty (%)	Pearson Correlation	-0.036	-0.060**	-0.013	0.149***
	Sig. (2-tailed)	0.217	0.041	0.648	0.000
	N	1147	1147	1147	1147
Total Females (%)	Pearson Correlation	-0.020	0.002	-0.028	0.018
	Sig. (2-tailed)	0.554	0.962	0.404	0.584
	N	901	901	901	901
People of all ages in poverty (%)	Pearson Correlation	-0.045	-0.059*	-0.026	0.124***
	Sig. (2-tailed)	0.128	0.044	0.381	0.000
	N	1,147	1,147	1,147	1,147
People of all ages in poverty (abs)	Pearson Correlation	0.116***	0.058*	0.099***	0.034
	Sig. (2-tailed)	0.000	0.050	0.001	0.248
	N	1,147	1,147	1,147	1,147
Households with income of $150,000 or more	Pearson Correlation	0.137**	0.067	0.295***	-0.162**
	Sig. (2-tailed)	0.032	0.295	0.000	0.011
	N	245	245	245	245
Households with income of $125,000 to $149,999	Pearson Correlation	0.168***	0.051	0.368***	-0.164***
	Sig. (2-tailed)	0.009	0.428	0.000	0.010
	N	245	245	245	245

Variables		Fatalities	Injuries	Property damage	Crop damage
Households with income of $100,000 to $124,999	Pearson Correlation	.153**	0.074	0.399***	-0.180***
	Sig. (2-tailed)	0.017	0.249	0.000	0.005
	N	245	245	245	245
Per capita personal income ($)	Pearson Correlation	0.056***	-0.006	0.091***	0.136***
	Sig. (2-tailed)	0.007	0.759	0.000	0.000
	N	2295	2295	2295	2295
Resident population: Hispanic or Latino Origin (%)	Pearson Correlation	0.066**	0.006	0.047	-0.016
	Sig. (2-tailed)	0.047	0.846	0.163	0.625
	N	901	901	901	901
Resident population: Asian alone (%)	Pearson Correlation	0.165***	0.022	0.143***	-0.004
	Sig. (2-tailed)	0.000	0.504	0.000	0.905
	N	901	901	901	901
Resident population: American Indian and Alaska Native alone (%)	Pearson Correlation	-0.001	-0.019	0.001	0.029
	Sig. (2-tailed)	0.972	0.567	0.987	0.383
	N	901	901	901	901
Resident population: Black alone (%)	Pearson Correlation	-0.057*	0.006	-0.056*	0.085**
	Sig. (2-tailed)	0.087	0.851	0.095	0.011
	N	901	901	901	901
Educational attainment - persons 25 years and over - percent high school graduate or higher	Pearson Correlation	0.137**	0.032	0.207***	-0.129**
	Sig. (2-tailed)	0.013	0.569	0.000	0.020
	N	327	327	327	327
Public School Enrollment	Pearson Correlation	0.094***	0.049**	0.074***	-0.007
	Sig. (2-tailed)	0.000	0.038	0.002	0.761
	N	1803	1803	1803	1803
Earnings in all industries (TH$)	Pearson Correlation	0.156***	0.032	0.124***	0.017
	Sig. (2-tailed)	0.000	0.409	0.001	0.660
	N	656	656	656	656
Civilian labor force unemployment rate	Pearson Correlation	0.023	-0.016	0.040*	0.025
	Sig. (2-tailed)	0.346	0.503	0.094	0.308
	N	1,721	1,721	1,721	1,721
Civilian labor force unemployment	Pearson Correlation	0.220***	0.038	0.193***	0.010
	Sig. (2-tailed)	0.000	0.113	0.000	0.671
	N	1,721	1,721	1,721	1,721
Private nonfarm employment - other services (except public administration)	Pearson Correlation	0.120***	0.052	0.102***	0.049
	Sig. (2-tailed)	0.002	0.184	0.009	0.207
	N	655	655	655	655

Variables		Fatalities	Injuries	Property damage	Crop damage
Private nonfarm employment - accommodation and food services	Pearson Correlation	0.201**	0.025	0.133**	-0.012
	Sig. (2-tailed)	0.000	0.429	0.000	0.697
	N	983	983	983	983
Private nonfarm employment - arts, entertainment and recreation	Pearson Correlation	0.208***	0.021	0.141***	-0.026
	Sig. (2-tailed)	0.000	0.600	0.000	0.502
	N	655	655	655	655
Private nonfarm employment - health care and social assistance	Pearson Correlation	0.116***	0.052	0.080**	0.017
	Sig. (2-tailed)	0.000	0.106	0.012	0.591
	N	983	983	983	983
Private nonfarm employment - educational services	Pearson Correlation	-0.004	0.035	-0.011	0.032
	Sig. (2-tailed)	0.925	0.376	0.773	0.408
	N	655	655	655	655
Priv. nonfarm employment - admin., support, waste mgt. and remediation services	Pearson Correlation	0.123***	0.050	0.096**	0.009
	Sig. (2-tailed)	0.002	0.202	0.014	0.813
	N	655	655	655	655
Private nonfarm employment - management of companies and enterprises	Pearson Correlation	0.134***	0.038	0.103***	0.031
	Sig. (2-tailed)	0.001	0.338	0.008	0.423
	N	655	655	655	655
Private nonfarm employment - professional, scientific, and technical services	Pearson Correlation	0.119***	0.034	0.124***	0.010
	Sig. (2-tailed)	0.000	0.280	0.000	0.743
	N	983	983	983	983
Private nonfarm employment - real estate, rental and leasing	Pearson Correlation	0.135***	0.056	0.100**	0.017
	Sig. (2-tailed)	0.001	0.153	0.010	0.657
	N	655	655	655	655
Private nonfarm establishments - finance and insurance	Pearson Correlation	0.099***	0.041	0.072**	0.016
	Sig. (2-tailed)	0.002	0.198	0.024	0.611
	N	983	983	983	983
Private nonfarm employment - information	Pearson Correlation	0.073*	0.038	0.082**	0.035
	Sig. (2-tailed)	0.062	0.332	0.036	0.371
	N	655	655	655	655
Private nonfarm employment - transportation and warehousing	Pearson Correlation	0.070*	0.058	0.039	0.022
	Sig. (2-tailed)	0.074	0.138	0.322	0.567
	N	655	655	655	655
Private nonfarm employment - retail trade	Pearson Correlation	0.132***	0.080**	0.093***	0.002
	Sig. (2-tailed)	0.000	0.013	0.004	0.948
	N	983	983	983	983

Variables		Fatalities	Injuries	Property damage	Crop damage
Private nonfarm employment - wholesale trade	Pearson Correlation	0.063**	0.065**	0.027	0.010
	Sig. (2-tailed)	.047	.041	.404	.751
	N	983	983	983	983
Private nonfarm employment - manufacturing	Pearson Correlation	.043	.114***	.067**	-.023
	Sig. (2-tailed)	0.176	0.000	0.036	0.480
	N	983	983	983	983
Private nonfarm employment - construction	Pearson Correlation	0.114***	0.075**	0.078**	-0.002
	Sig. (2-tailed)	0.000	0.019	0.014	0.951
	N	983	983	983	983
Private nonfarm employment - utilities	Pearson Correlation	0.047	0.128***	0.131***	0.021
	Sig. (2-tailed)	0.235	0.001	0.001	0.599
	N	655	655	655	655
Private nonfarm employment -mining	Pearson Correlation	0.008	0.069*	-0.021	0.026
	Sig. (2-tailed)	0.847	0.080	0.587	0.504
	N	655	655	655	655
Private nonfarm employment - forestry, fishing, hunting, and agriculture support	Pearson Correlation	-0.044	0.024	-0.043	0.015
	Sig. (2-tailed)	0.256	0.537	0.270	0.707
	N	655	655	655	655
Private nonfarm employment	Pearson Correlation	0.099***	0.037*	0.072***	0.004
	Sig. (2-tailed)	0.000	0.070	0.000	0.837
	N	2,458	2,458	2,458	2,458
Median household income ($)	Pearson Correlation	0.066**	0.065**	0.079***	0.026
	Sig. (2-tailed)	0.021	0.023	0.005	0.369
	N	1,229	1,229	1,229	1,229
Median Age (Complete Count)	Pearson Correlation	0.086	0.018	0.120**	0.162***
	Sig. (2-tailed)	0.122	0.739	0.029	0.003
	N	328	328	328	328
Resident population 65 years and over (%)	Pearson Correlation	-0.021	-0.056*	-0.007	-0.004
	Sig. (2-tailed)	0.531	0.096	0.824	0.906
	N	901	901	901	901
Resident population under 5 years (%)	Pearson Correlation	-0.005	0.042	-0.030	-0.008
	Sig. (2-tailed)	0.881	0.209	0.368	0.807
	N	901	901	901	901
Civilian labor force	Pearson Correlation	0.121***	0.049**	0.094***	-0.005
	Sig. (2-tailed)	0.000	0.043	0.000	0.821
	N	1,721	1,721	1,721	1,721

Variables		Fatalities	Injuries	Property damage	Crop damage
Resident population (complete count)	Pearson Correlation	0.111***	0.042**	0.085***	-0.004
	Sig. (2-tailed)	0.000	0.034	0.000	0.834
	N	2,540	2,540	2,540	2,540
Households with income of $100,000 or more	Pearson Correlation	0.152**	0.067	0.361***	-0.173***
	Sig. (2-tailed)	0.017	0.293	0.000	0.007
	N	245	245	245	245

Table A.9: Descriptive Statistics for Texas

	N	Minimum	Maximum	Mean	Std. Deviation
Social Vulnerability Index	508	-10.08	16.92	1.60	3.50
Population below poverty level	762	0	646,456	13,137.34	46,998.51
Employment status - in labor force, civilian labor force, employed, females (abs)	1,016	7	805,453	14,784.70	57,486.82
Cropland - total (acres) (adjusted)	762	0.00	641,654	143,592.26	119,205.45
Farm operators by principal occupation - farming (adjusted)	762	6	1581	411.65	305.30
Federal Government insurance (TH$)	7,112	0.00	71,903,660	215,976	2,221781
Federal Government expenditure - direct payments for individuals, retirement and disability (TH$)	7,112	94.00	7,472,991	1,212,401	412,693
Federal Government expenditure (TH$)	7,112	-54,856	34,433,912	383,006.67	1,594,704.10
Hospital insurance and/or supplemental medical insurance (Medicare) - disabled persons enrolled	2,286	0	54,654	1,336.07	4,120.69
Hospital insurance and/or supplemental medical insurance (Medicare) - aged persons enrolled	2,540	0	280,871	8,052.52	23,506.50
Hospital insurance and/or supplemental medical insurance (Medicare) - total persons enrolled	2,540	16	335,525	9,363.08	27,518.66
Female householders, no husband present	1,016	0	219,291	3,308.54	13,763.672
Total housing units	1,016	50.00	1,598,698	30,210	109,713

	N	Minimum	Maximum	Mean	Std. Deviation
Owner-occupied housing units - percent of total occupied housing units	1,270	20.00	87.70	72.5941	7.64
Median value of specified owner-occupied housing units ($)	1,016	0.00	227,500	52,210.92	30,230.41
Median gross rent of specified renter-occupied housing units paying cash rent	1,016	0.00	1183	373.27	175.11
Housing units by units in structure - mobile home or trailer	762	3	41,896	2,613.74	4,366.21
Components of change - net international migration	2,540	-3698	35,127	367.36	2,277.59
Components of change - net domestic migration	2,540	-50835	47,813	334.13	3,611.81
Place of birth, foreign-born (%)	508	0.00	37.80	7.91	6.53
Urban population (complete count)	762	0	3,338,908	55,346.90	242,388.61
Rural population (complete count)	762	0	119,078	8,439.95	13,098.741
Social security: disabled workers - benefit recipients	5,334	0	64,915	1,181.72	3,872.81
Social security - benefit recipients	5,842	10	429,760	10,389.53	30,400.62
Adjusted gross income- IRS (TH$)	1,270	710	91,764,937	1,800,529.55	7,001,120.73
Local government finances - direct general expenditures for health (TH$)	1,016	0.00	260,017	3,490.54	15,568.50
Local government finances - direct general expenditures (TH$)	1,270	517	13,062,052	147,546.99	659,374.71
Local government finances - general revenue, total FY (TH$)	1,270	624	1,1939,625	149,994.69	655,239.61
Total Females (%)	2,794	31.70	54	49.79	2.79
Related children age 5 to 17 in families in poverty (%)	3,556	4.30	66.70	23.63	8.36
People under age 18 in poverty (%)	3,556	4.80	409.90	26.7119	25.39
People of all ages in poverty (%)	3,556	3.50	52.00	17.90	6.22
People of all ages in poverty (abs)	3,556	5	6,86928	13,809.55	50,051.78
Households with income of $150,000 or more	762	0	131,370	1,368.87	7,352.98
Households with income of $125,000 to $149,999	762	0	62,058	723.99	3,578.79
Households with income of $100,000 to $124,999	762	0	99,900	1,383.55	6,332.88
Per capita personal income ($)	7,112	3,189	100,711	17,512.58	7,294.65
Resident population: Hispanic or Latino Origin (%)	2,794	1.70	97.50	29.79	22.59
Resident population: Asian alone (%)	2,794	.00	17.00	0.757	1.34
Resident population: American Indian and Alaska Native alone (%)	2,794	.00	4.90	0.730	0.330
Resident population: Black alone (%)	2,794	0.00	34.70	6.94	6.91

	N	Minimum	Maximum	Mean	Std. Deviation
Educational attainment - persons 25 years and over - percent high school graduate or higher	1,016	25.90	97.40	65.99	12.65
Public School Enrollment	5,588	0	755,290	15,351.35	53,932.187
Earnings in all industries (TH$)	2,032	982	197,109,914	2,290,638	12,602,419
Civilian labor force unemployment rate	5,334	0.80	40.50	5.87	3.23
Civilian labor force unemployment	5,334	1	170,211	2,417.23	9,138.705
Private nonfarm employment - other services (except public administration)	1,778	0	81,733	1,592.53	6,769.269
Private nonfarm employment - accommodation and food services	3,048	0	156,075	3,064.79	12,650.45
Private nonfarm employment - arts, entertainment and recreation	2,032	0	22,295	405.84	1,925.99
Private nonfarm employment - health care and social assistance	3,048	0	206,808	4,100.96	15,985.483
Private nonfarm employment - educational services	2,025	0	34,997	493.45	2,763.639
Priv. nonfarm employment - admin., support, waste mgt. and remediation services	2,032	0	189,077	2,559.00	14,680.048
Private nonfarm employment - management of companies and enterprises	2,032	0	90,334	910.76	6,446.905
Private nonfarm employment - professional, scientific, and technical services	3,048	0	176,943	1,980.59	12,216.942
Private nonfarm employment - real estate, rental and leasing	2,032	0	41,578	649.50	3,533.121
Private nonfarm establishments - finance and insurance	3,048	0	104,938	1,665.16	8,883.03
Private nonfarm employment - information	2,032	0	69,910	975.51	5,373.43
private nonfarm employment - transportation and warehousing	2,032	0	99,856	1,328.08	7,614.283
Private nonfarm employment - retail trade	3,048	0	185,743	4,224.01	15,889.559
Private nonfarm employment - wholesale trade	3,048	0	118,024	1,767.81	9,718.595
Private nonfarm employment - manufacturing	3,048	0	174,311	3,412.52	14,673.274
Private nonfarm employment - construction	3,048	0	150,228	2,077.99	10,282.06
Private nonfarm employment - utilities	2,032	0	15,257	128.92	803.60
Private nonfarm employment - mining	2,032	0	56,154	420.23	2,252.42
Private nonfarm employment - forestry, fishing, hunting, and agriculture support	2,032	0	462	21.99	55.95
Private nonfarm employment	7,620	0	1,841,062	26,587.07	130,009
Median household income ($)	3,810	10,182	83,968	33,755.23	9,553.15
Median Age (Complete Count)	1,016	22.30	55.40	35.50	5.69
Resident population 65 years and over (%)	2,794	5.00	31.10	15.25	4.52

	N	Minimum	Maximum	Mean	Std. Deviation
Resident population under 5 years (%)	2,794	2.00	13.40	6.87	1.49
Civilian labor force	5,334	38	2,009,311	40,798.82	152,658.36
Resident population (complete count)	7,874	40	4,092,459	76,593.65	279,165.16
Injuries	7,872	0	12,000	3.21	137.40
Fatalities	7,872	0	38	0.15	1.06
Property damage	7,872	0.00	62,745,3000	2,889,295	24,834,261
Crop damage	7,872	0.00	101,500,000	1,173,176.11	5,407,480.19
Households with income of $100,000 or more	762	0.00	293,328	3,476.41	17,201.27

Table A.10: Correlation Table for Texas

		Fatalities	Injuries	Property damage	Crop damage
Social Vulnerability Index	Pearson Correlation	0.059	-0.007	-0.073	0.070
	Sig. (2-tailed)	0.188	0.880	0.102	0.114
	N	508	508	508	508
Population below poverty level	Pearson Correlation	0.605***	0.141***	0.218***	0.016
	Sig. (2-tailed)	0.000	0.000	0.000	0.663
	N	762	762	762	762
Employment status - in labor force, civilian labor force, employed, females (abs)	Pearson Correlation	0.516***	-0.004	0.126***	-0.020
	Sig. (2-tailed)	0.000	0.903	0.000	0.533
	N	1016	1016	1016	1016
Cropland - total (acres) (adjusted)	Pearson Correlation	0.026	0.042	0.051	0.107***
	Sig. (2-tailed)	0.467	0.248	0.156	0.003
	N	762	762	762	762
Farm operators by principal occupation - farming (adjusted)	Pearson Correlation	0.117***	0.088**	0.068*	-0.011
	Sig. (2-tailed)	0.001	0.015	0.060	0.768
	N	762	762	762	762
Federal Government insurance (TH$)	Pearson Correlation	0.205***	0.000	0.109***	-0.007
	Sig. (2-tailed)	0.000	0.988	0.000	0.563
	N	7,110	7,110	7,110	7,110
Federal Government expenditure - direct payments for individuals, retirement and disability (TH$)	Pearson Correlation	0.338***	0.007	0.133***	0.029**
	Sig. (2-tailed)	0.000	0.536	0.000	0.014
	N	7,110	7,110	7,110	7,110
Federal Government expenditure (TH$)	Pearson Correlation	0.319***	0.005	0.126***	0.031***
	Sig. (2-tailed)	0.000	0.653	0.000	0.009
	N	7,110	7,110	7,110	7,110

		Fatalities	Injuries	Property damage	Crop damage
Hospital insurance and/or supplemental medical insurance (Medicare) - disabled persons enrolled	Pearson Correlation	0.412**	-0.003	0.088**	0.033
	Sig. (2-tailed)	0.000	0.899	0.000	0.112
	N	2,286	2,286	2,286	2,286
Hospital insurance and/or supplemental medical insurance (Medicare) - aged persons enrolled	Pearson Correlation	0.471***	0.005	0.093***	0.015
	Sig. (2-tailed)	0.000	0.803	0.000	0.461
	N	2,540	2,540	2,540	2,540
Hospital insurance and/or supplemental medical insurance (Medicare) - total persons enrolled	Pearson Correlation	0.466***	0.005	0.092***	0.015
	Sig. (2-tailed)	0.000	0.811	0.000	0.436
	N	2,540	2,540	2,540	2,540
Female householders, no husband present	Pearson Correlation	.458***	-.004	.057*	.001
	Sig. (2-tailed)	.000	.906	.071	.983
	N	1,016	1,016	1,016	1,016
Total housing units	Pearson Correlation	.463***	-.004	.059*	-.004
	Sig. (2-tailed)	.000	.893	.062	.891
	N	1,016	1,016	1,016	1,016
Owner-occupied housing units - percent of total occupied housing units	Pearson Correlation	-.132***	-.014	-.086***	-.036
	Sig. (2-tailed)	0.000	0.626	0.002	0.204
	N	1,270	1,270	1,270	1,270
Median value of specified owner-occupied housing units ($)	Pearson Correlation	0.088***	-0.004	0.038	-0.091***
	Sig. (2-tailed)	0.005	0.910	0.232	0.004
	N	1,016	1,016	1,016	1,016
Median gross rent of specified renter-occupied housing units paying cash rent	Pearson Correlation	0.077**	-0.011	0.012	-0.049
	Sig. (2-tailed)	0.015	0.735	0.692	0.117
	N	1,016	1,016	1,016	1,016
Housing units by units in structure - mobile home or trailer	Pearson Correlation	0.394***	-0.005	0.092**	-0.080**
	Sig. (2-tailed)	0.000	0.890	0.011	0.028
	N	762	762	762	762
Components of change - net international migration	Pearson Correlation	0.345***	-0.002	0.109***	0.020
	Sig. (2-tailed)	0.000	0.936	0.000	0.325
	N	2,540	2,540	2,540	2,540
Components of change - net domestic migration	Pearson Correlation	-0.041**	-0.001	0.028	0.034*
	Sig. (2-tailed)	0.037	0.964	0.155	0.089
	N	2,540	2,540	2,540	2,540
Place of birth, foreign-born (%)	Pearson Correlation	0.127***	0.022	0.129***	-0.056
	Sig. (2-tailed)	0.004	0.627	0.004	0.205
	N	508	508	508	508

		Fatalities	Injuries	Property damage	Crop damage
Urban population (complete count)	Pearson Correlation	0.577**	-0.005	0.040	-0.007
	Sig. (2-tailed)	0.000	0.898	0.269	0.847
	N	762	762	762	762
Rural population (complete count)	Pearson Correlation	0.035	-0.018	.023	-0.086*
	Sig. (2-tailed)	0.332	0.623	0.534	0.017
	N	762	762	762	762
Social security: disabled workers - benefit recipients	Pearson Correlation	0.360***	0.004	0.134***	0.022
	Sig. (2-tailed)	0.000	0.758	0.000	0.104
	N	5,334	5,334	5,334	5,334
Social security - benefit recipients	Pearson Correlation	0.402***	0.006	0.140***	0.016
	Sig. (2-tailed)	0.000	0.626	0.000	0.222
	N	5,842	5,842	5,842	5,842
Adjusted gross income- IRS (TH$)	Pearson Correlation	0.355***	0.100***	0.096***	.052*
	Sig. (2-tailed)	0.000	0.000	0.001	0.064
	N	1,270	1,270	1,270	1,270
Local government finances - direct general expenditures for health (TH$)	Pearson Correlation	0.129***	0.125***	0.205***	0.007
	Sig. (2-tailed)	0.000	0.000	0.000	0.828
	N	1,016	1,016	1,016	1,016
Local government finances - direct general expenditures (TH$)	Pearson Correlation	.136***	.109***	.208***	.020
	Sig. (2-tailed)	0.000	0.000	0.000	0.477
	N	1,270	1,270	1,270	1,270
Local government finances - general revenue, total FY (TH$)	Pearson Correlation	0.139***	0.112***	0.217***	0.017
	Sig. (2-tailed)	0.000	0.000	0.000	0.544
	N	1,270	1,270	1,270	1,270
Total Females (%)	Pearson Correlation	0.022	0.004	-0.011	0.012
	Sig. (2-tailed)	0.239	0.826	0.547	0.516
	N	2,794	2,794	2,794	2,794
Related children age 5 to 17 in families in poverty (%)	Pearson Correlation	-0.066***	0.006	-0.057***	-0.014
	Sig. (2-tailed)	0.000	0.711	0.001	0.400
	N	3,556	3,556	3,556	3,556
People under age 18 in poverty (%)	Pearson Correlation	-0.015	0.000	-0.024	0.002
	Sig. (2-tailed)	0.360	0.979	0.146	0.883
	N	3,556	3,556	3,556	3,556
People of all ages in poverty (%)	Pearson Correlation	-0.065***	0.007	-.046***	-0.021
	Sig. (2-tailed)	0.000	0.693	0.006	0.204
	N	3,556	3,556	3,556	3,556

		Fatalities	Injuries	Property damage	Crop damage
People of all ages in poverty (abs)	Pearson Correlation	.379***	0.004	0.124***	0.000
	Sig. (2-tailed)	0.000	0.798	0.000	0.987
	N	3,556	3,556	3,556	3,556
Households with income of $150,000 or more	Pearson Correlation	0.546***	0.109***	0.245***	-0.039
	Sig. (2-tailed)	0.000	0.003	0.000	.281
	N	762	762	762	762
Households with income of $125,000 to $149,999	Pearson Correlation	0.559***	0.105***	0.249***	-0.043
	Sig. (2-tailed)	0.000	0.004	0.000	0.233
	N	762	762	762	762
Households with income of $100,000 to $124,999	Pearson Correlation	0.594***	0.112***	0.245***	-0.046
	Sig. (2-tailed)	0.000	0.002	0.000	0.209
	N	762	762	762	762
Per capita personal income ($)	Pearson Correlation	0.075***	0.010	0.070***	0.126***
	Sig. (2-tailed)	0.000	0.394	0.000	0.000
	N	7,110	7,110	7,110	7,110
Resident population: Hispanic or Latino Origin (%)	Pearson Correlation	0.004	0.008	-0.068***	-0.053***
	Sig. (2-tailed)	0.833	0.663	0.000	0.005
	N	2,794	2,794	2,794	2,794
Resident population: Asian alone (%)	Pearson Correlation	0.224***	-0.004	0.122***	0.005
	Sig. (2-tailed)	0.000	0.831	0.000	0.781
	N	2,794	2,794	2,794	2,794
Resident population: American Indian and Alaska Native alone (%)	Pearson Correlation	0.004	-0.002	-0.041*	0.046*
	Sig. (2-tailed)	0.835	0.918	0.030	.015
	N	2,794	2,794	2,794	2,794
Resident population: Black alone (%)	Pearson Correlation	0.093***	0.006	0.146***	0.003
	Sig. (2-tailed)	0.000	0.753	0.000	0.855
	N	2,794	2,794	2,794	2,794
Educational attainment - persons 25 years and over - percent high school graduate or higher	Pearson Correlation	.060*	-.010	-.044	.001
	Sig. (2-tailed)	0.056	0.754	0.163	0.974
	N	1,016	1,016	1,016	1,016
Public School Enrollment	Pearson Correlation	0.386***	0.005	0.127***	0.020
	Sig. (2-tailed)	0.000	0.709	0.000	0.129
	N	5,586	5,586	5,586	5,586
Earnings in all industries (TH$)	Pearson Correlation	0.409***	-0.002	0.074***	0.028
	Sig. (2-tailed)	0.000	0.936	0.001	0.202
	N	2,032	2,032	2,032	2,032

		Fatalities	Injuries	Property damage	Crop damage
Civilian labor force unemployment rate	Pearson Correlation	-0.027**	-0.015	-0.007	-0.053***
	Sig. (2-tailed)	0.048	0.265	0.624	0.000
	N	5,334	5,334	5,334	5,334
Civilian labor force unemployment	Pearson Correlation	0.338***	0.002	0.118***	0.002
	Sig. (2-tailed)	0.000	0.864	0.000	0.870
	N	5,334	5,334	5,334	5,334
Private nonfarm employment - other services (except public administration)	Pearson Correlation	0.344***	0.091***	0.070***	0.036
	Sig. (2-tailed)	0.000	0.000	0.003	0.126
	N	1,778	1,778	1,778	1,778
Private nonfarm employment - accommodation and food services	Pearson Correlation	0.459***	0.003	0.103***	0.015
	Sig. (2-tailed)	0.000	0.886	0.000	0.423
	N	3,048	3,048	3,048	3,048
Private nonfarm employment - arts, entertainment and recreation	Pearson Correlation	0.397***	0.106***	0.092***	0.032
	Sig. (2-tailed)	0.000	0.000	0.000	0.156
	N	2,032	2,032	2,032	2,032
Private nonfarm employment - health care and social assistance	Pearson Correlation	0.448***	0.003	0.100***	0.009
	Sig. (2-tailed)	0.000	0.866	0.000	0.608
	N	3,048	3,048	3,048	3,048
Private nonfarm employment - educational services	Pearson Correlation	0.382***	0.091***	0.074***	0.036
	Sig. (2-tailed)	0.000	0.000	0.001	0.107
	N	2,025	2,025	2,025	2,025
Priv. nonfarm employment - admin., support, waste mgt. and remediation services	Pearson Correlation	0.368***	0.086***	0.076***	0.031
	Sig. (2-tailed)	0.000	0.000	0.001	0.158
	N	2,032	2,032	2,032	2,032
Private nonfarm employment - management of companies and enterprises	Pearson Correlation	0.374***	0.081***	0.063***	0.024
	Sig. (2-tailed)	0.000	0.000	0.004	0.282
	N	2,032	2,032	2,032	2,032
Private nonfarm employment - professional, scientific, and technical services	Pearson Correlation	0.457***	0.001	0.093***	0.009
	Sig. (2-tailed)	.000	0.947	0.000	0.630
	N	3,048	3,048	3,048	3,048
Private nonfarm employment - real estate, rental and leasing	Pearson Correlation	0.378***	0.092***	.077***	0.029
	Sig. (2-tailed)	.000	0.000	0.001	0.199
	N	2,032	2,032	2,032	2,032
Private nonfarm establishments - finance and insurance	Pearson Correlation	0.450***	0.003	0.074***	0.024
	Sig. (2-tailed)	0.000	0.889	0.000	0.188
	N	3,048	3,048	3,048	3,048

		Fatalities	Injuries	Property damage	Crop damage
Private nonfarm employment - information	Pearson Correlation	.351***	.089***	.062***	.045**
	Sig. (2-tailed)	0.000	0.000	0.005	0.043
	N	2,032	2,032	2,032	2,032
Private nonfarm employment - transportation and warehousing	Pearson Correlation	0.375***	0.080***	0.075***	0.035
	Sig. (2-tailed)	0.000	0.000	0.001	0.111
	N	2,032	2,032	2,032	2,032
Private nonfarm employment - retail trade	Pearson Correlation	0.477***	0.003	0.109***	0.015
	Sig. (2-tailed)	0.000	0.885	0.000	0.423
	N	3,048	3,048	3,048	3,048
Private nonfarm employment - wholesale trade	Pearson Correlation	0.500***	0.002	0.086***	0.016
	Sig. (2-tailed)	0.000	0.927	0.000	0.384
	N	3,048	3,048	3,048	3,048
Private nonfarm employment - manufacturing	Pearson Correlation	0.499***	0.002	0.095***	0.017
	Sig. (2-tailed)	0.000	0.908	0.000	0.360
	N	3,048	3,048	3,048	3,048
Private nonfarm employment - construction	Pearson Correlation	0.499***	0.002	0.111***	0.008
	Sig. (2-tailed)	0.000	0.908	0.000	0.660
	N	3,048	3,048	3,048	3,048
Private nonfarm employment - utilities	Pearson Correlation	0.309***	0.099***	0.054**	0.009
	Sig. (2-tailed)	0.000	0.000	0.015	0.669
	N	2,032	2,032	2,032	2,032
Private nonfarm employment -mining	Pearson Correlation	0.293***	0.071***	0.062***	-0.009
	Sig. (2-tailed)	0.000	0.001	0.005	0.687
	N	2,032	2,032	2,032	2,032
Private nonfarm employment - forestry, fishing, hunting, and agriculture support	Pearson Correlation	.069***	.056**	.086***	.008
	Sig. (2-tailed)	0.002	0.012	0.000	0.715
	N	2,032	2,032	2,032	2,032
Private nonfarm employment	Pearson Correlation	0.402***	0.007	0.119***	0.021*
	Sig. (2-tailed)	0.000	0.566	0.000	0.069
	N	7,618	7,618	7,618	7,618
Median household income ($)	Pearson Correlation	0.092**	-0.008	0.099**	0.008
	Sig. (2-tailed)	0.000	0.622	0.000	0.641
	N	3,810	3,810	3,810	3,810
Median Age (Complete Count)	Pearson Correlation	-0.075**	0.004	-0.093***	-0.025
	Sig. (2-tailed)	0.017	0.908	0.003	0.423
	N	1,016	1,016	1,016	1,016

		Fatalities	Injuries	Property damage	Crop damage
Resident population 65 years and over (%)	Pearson Correlation	-0.117***	0.005	-0.083***	-0.016
	Sig. (2-tailed)	0.000	0.801	0.000	0.397
	N	2,794	2,794	2,794	2,794
Resident population under 5 years (%)	Pearson Correlation	0.079***	0.002	0.010	0.019
	Sig. (2-tailed)	0.000	0.905	0.611	0.322
	N	2,794	2,794	2,794	2,794
Civilian labor force	Pearson Correlation	0.424**	0.005	0.136**	0.015
	Sig. (2-tailed)	0.000	0.702	0.000	0.270
	N	5,334	5,334	5,334	5,334
Resident population (complete count)	Pearson Correlation	0.380***	0.007	0.126***	0.025**
	Sig. (2-tailed)	0.000	0.536	0.000	0.029
	N	7,872	7,872	7,872	7,872
Households with income of $100,000 or more	Pearson Correlation	0.568***	0.109***	0.247***	-0.042
	Sig. (2-tailed)	0.000	0.002	0.000	0.242
	N	762	762	762	762

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